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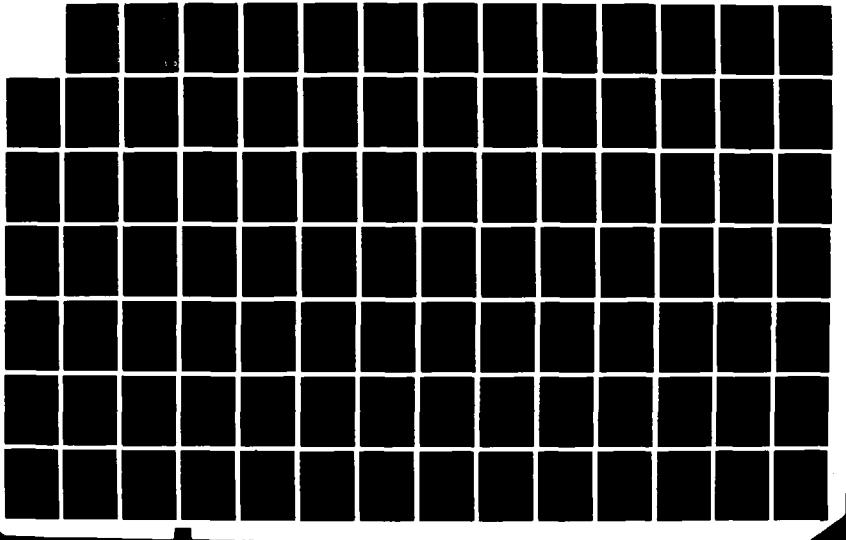

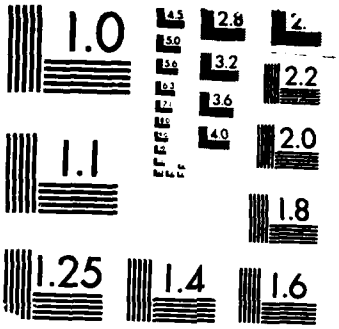

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ANALYSIS TECHNIQUES FOR MICROWAVE DOSIMETRIC DATA

ANNUAL REPORT

By
J. R. DEMOS
MICHAEL J. CAMPBELL

OCTOBER 1985

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Water Loaded Microwave Scanner, ~~Scanner~~

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The objective of the effort covered by this report was to provide a set of software tools which can be used for data collection and presentation. Data collection was implemented using a network analyzer and a water loaded microwave scanner. Transmission and reflection data was acquired with this system and representative data is presented in this report. The data acquisition speed of the network analyzer was improved by a factor of two by rewriting the measurement software. Keywords:

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Summary

The objective of the effort covered by this report was to provide a set of software tools which can be used for data collection and presentation. Data collection was implemented using a network analyzer and a water loaded microwave scanner. Transmission and reflection data was acquired with this system and representative data is presented in this report. The data acquisition speed of the network analyzer was improved by a factor of two by rewriting the measurement software.

FOREWORD

Citations of commercial organizations and trade names in this report do not constitute an official Department of the Army endorsement or approval of the products or services of these organizations.

Table of Contents

SECTION I

Introduction

The developments described in this Annual Report cover software programs and system modifications which were developed to provide various options for scanning an object with the water loaded microwave scanner. All the programs were designed to be used in an interactive mode. The user is presented with a menu or quired for the parameters necessary to make the desired measurements. This report presents a brief overview of the system capabilities and provides samples of the results obtained with the system. Complete operational procedures along with a detailed description of the various programs can be found in the System Users Manual. As can be seen from the presented data, the microwave scanner system is operational at the present time.

SECTION II

DATA COLLECTION CAPABILITIES

A. LINE SCANS

The basic capability needed to obtain a picture of a sample is to be able to scan along the sample in a straight line. The system provides this capability by having the sample remain fixed while the two antennae (transmitting on one side of the sample and receiving on the other side) are moved together along a straight line. Figure 1 shows a plot of a simple line scan taken of a hollow epoxy-nylon tube of 8 mm outside diameter and 6 mm inside diameter. The antennae were about 2 mm to either side of the tube.

The frequency was 2.6 Giga-hertz. The frequency of a scan can be set anywhere from 2.5 Giga-hertz to 3.5 Giga-hertz. The electronics can actually range from 100 Mega-hertz to 12.4 Giga-hertz but the antennae are very inefficient beyond the range of 2.5 to 3.5 Giga-hertz.

The user has the capability of scanning over many frequencies during a line scan. Figure 2 shows the same sample as figure 1 with the frequency varying from 2.5 Giga-hertz to 3.5 Giga-hertz in steps of .1 Giga-hertz. Each line has its own marker with the first 1 to 9 frequencies marked with "1" to "9" respectively. The tenth frequency is marked with "." and the eleventh with "+". Both figure 1 and figure 2 are copies of what appears on the CRT during a scan and are provided to give the user a compact representation of the data. From figure 2 one can see that each of the frequencies gives approximately the same shape of line scan but the overall attenuation varies greatly with 2.5 Giga-hertz having the most and 2.9 Giga-hertz having the least attenuation. If the user later decides he wants to look more closely at a graph of one frequency, he can go back to the data and have a single frequency plotted. Figures 3 to 13 show a scan similar to that shown in figure 2, but each frequency is plotted separately.

One usually takes transmission data to get a representation of the inside of a sample as was done to make figures 1 to 13. However, one can obtain other useful information by measuring the attenuation of the reflected wave. The user has the capability of taking reflection scans in the same manner as transmission scans are taken. The graphs are similar to the transmission graphs except that the attenuation is much greater.

The user also has the capability of repeating the measurement several times at each data point for statistical averaging. If a frequency scan is done, the frequency is scanned before any measurements are repeated instead of repeating the measurements at each frequency of a frequency scan. It is done this way to have the greatest time between different measurements of the same frequency.

The position accuracy of a linear scan was measured by measuring the difference between the desired position and the achieved position. Ten measurements were taken for each of three days. The root mean square difference between the desired and achieved position is .002 mm. The time required to run a scan can be quite long since a typical scan usually has several thousand data points. If we take a linear scan with only one attenuation measurement per position, the time for each position was found to be 2.3 seconds. This time was measured with a stop watch by measuring the time it takes to run a scan over 32 positions at one frequency and with no statistical averaging. From previous measurements, the time to move the position 1 mm was found to be 1.3 seconds. Therefore the other second can be assumed to be used to take the attenuation measurement. Thus the time per scan can be given by the formula:

for step sizes up to 2.9 mm

$$T = Np[1.3*sqrt(d)] + Na$$

for 1 mm step size, this reduces to

$$T = 1.3\ Np + Na$$

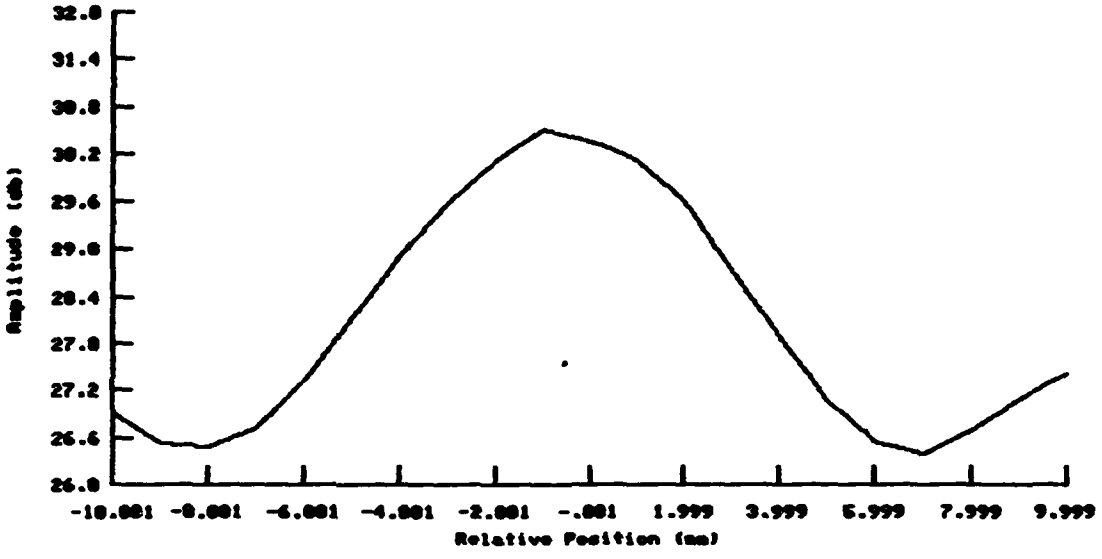
for step sizes greater than 2.9 mm

$$T = Np[2.2 + 0.06(d-29)] + Na$$

Where

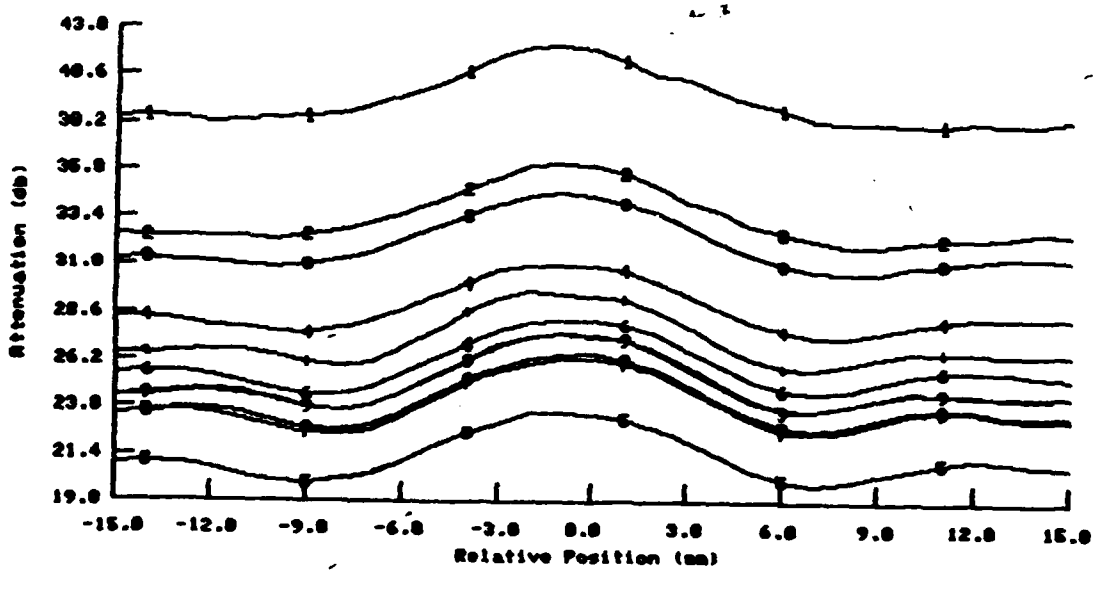
T = time in seconds for the scan
Na = number of measurements
Np = number of positions
d. = distence between measurement points in millimeters

Figure 1



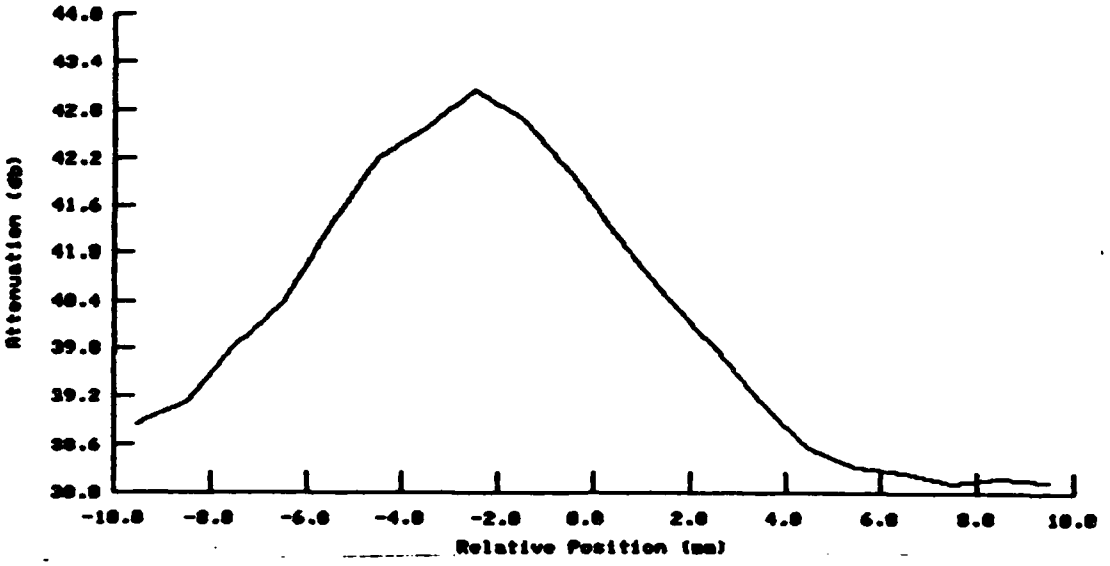
2.6 Giga-hertz 8mm O. D. tube

Figure 2



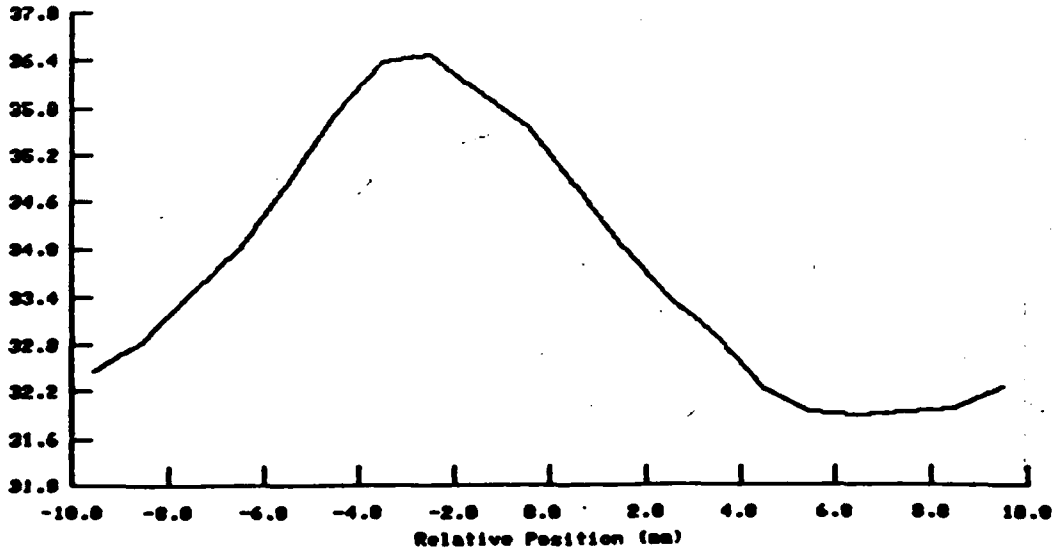
2.5 - 3.5 Giga-hertz 8mm O. D. tube

Figure 3



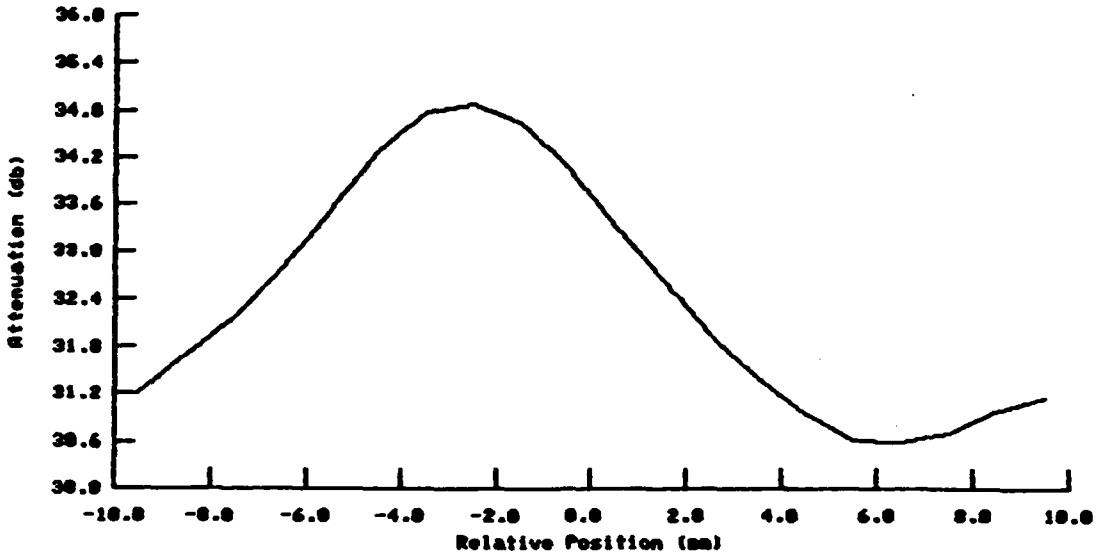
2.5 Giga-hertz 8mm O. D. tube

Figure 4



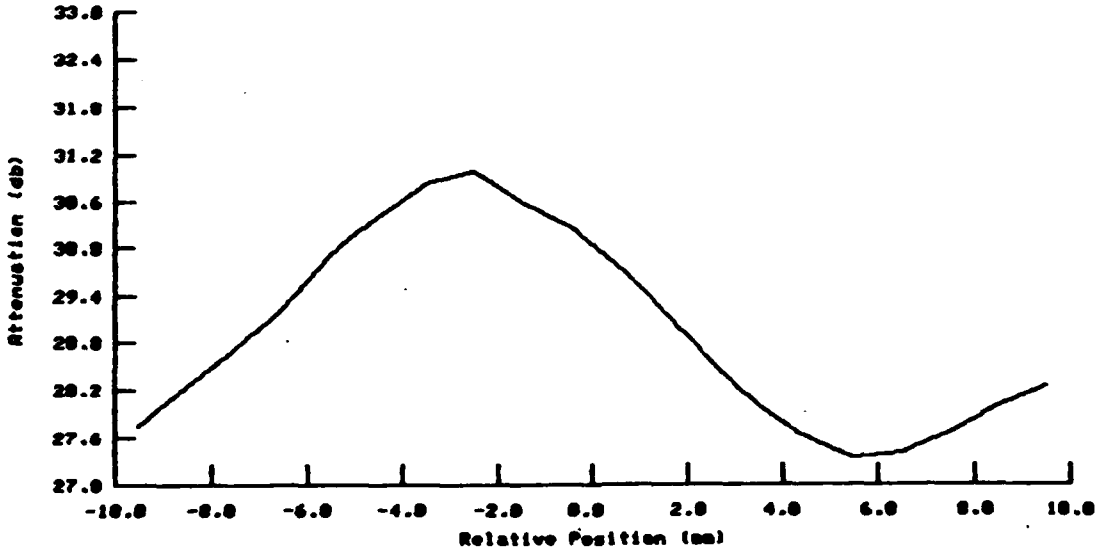
2.6 Giga-hertz 8mm O. D. tube

Figure 5



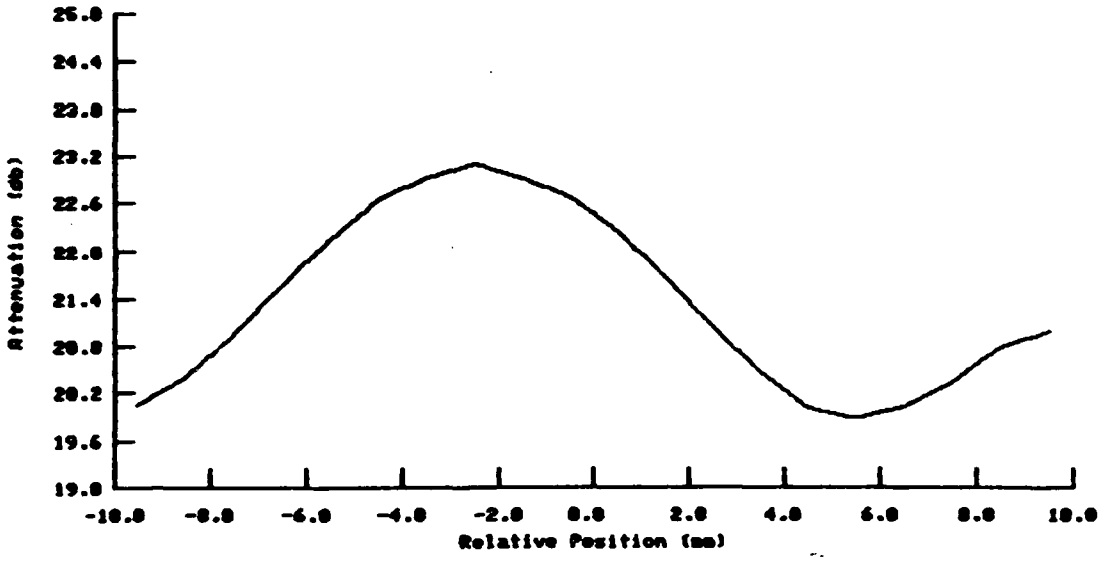
2.7 Giga-hertz 8mm O. D. tube

Figure 6



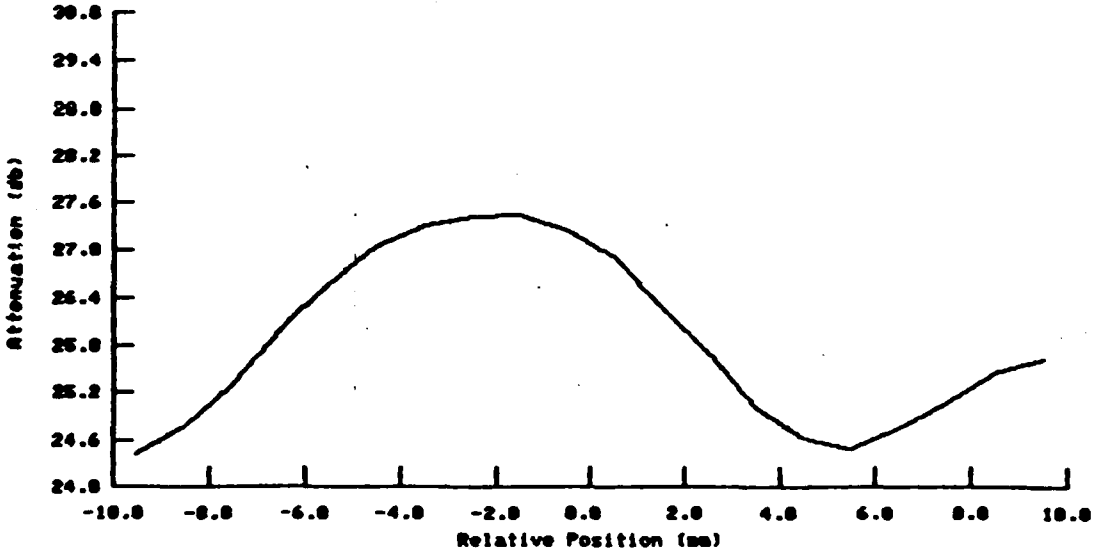
2.8 Giga-hertz 8mm O. D. tube

Figure 7



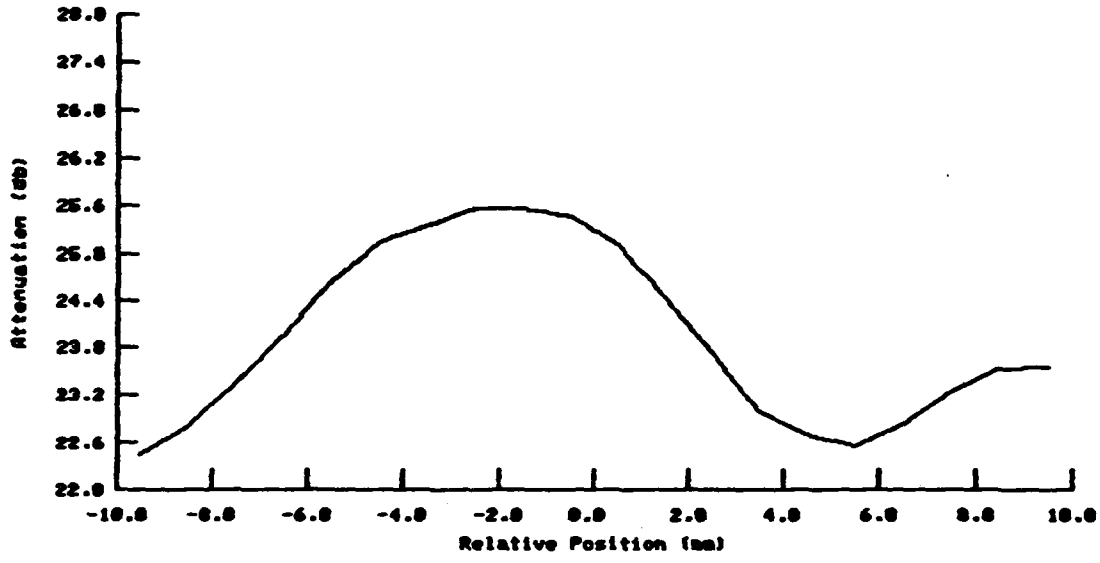
2.9 Giga-hertz 8mm O. D. tube

Figure 8



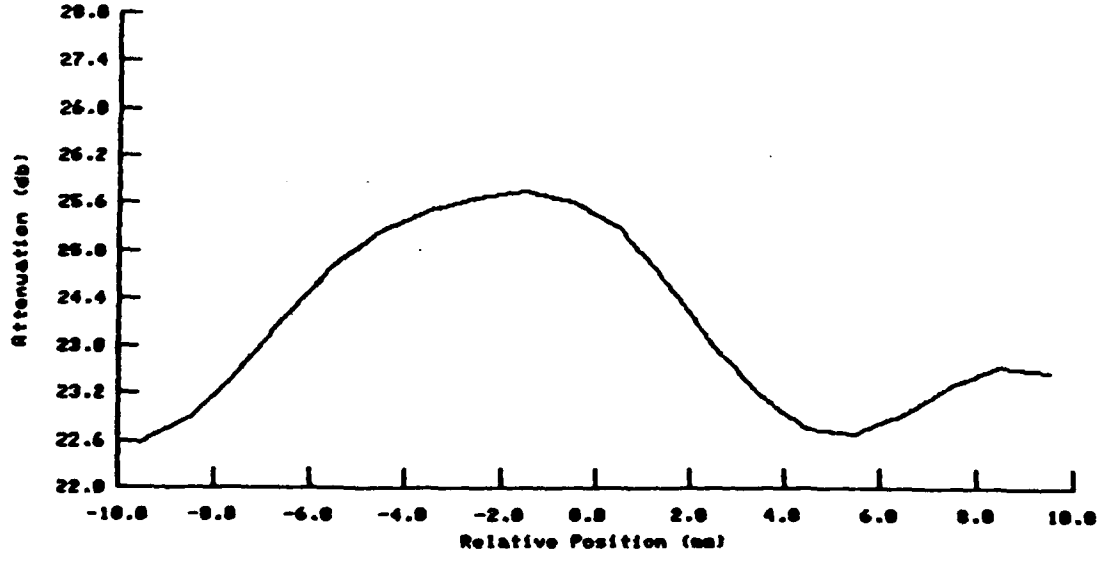
3.0 Giga-hertz 8mm O. D tube

Figure 9



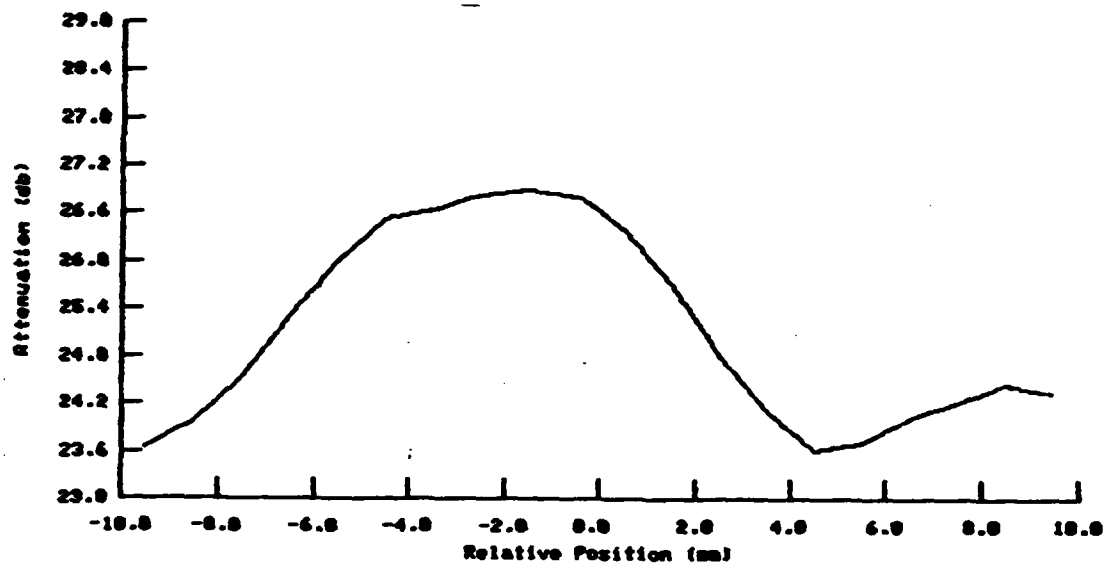
3.1 Giga-hertz 8mm O. D. tube

Figure 10



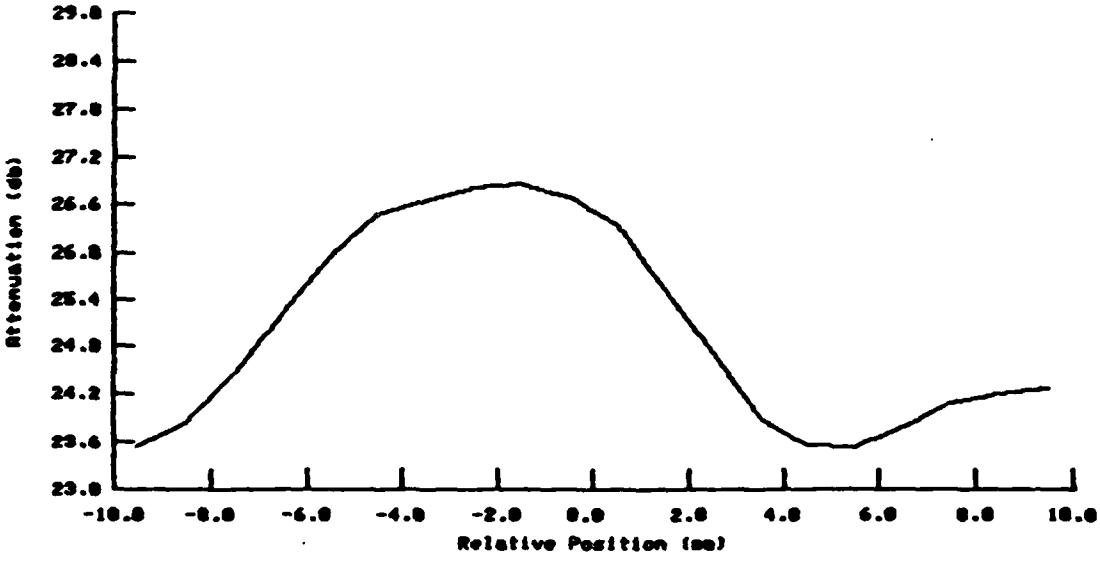
3.2 Giga-hertz 8mm O. D. tube

Figure 11



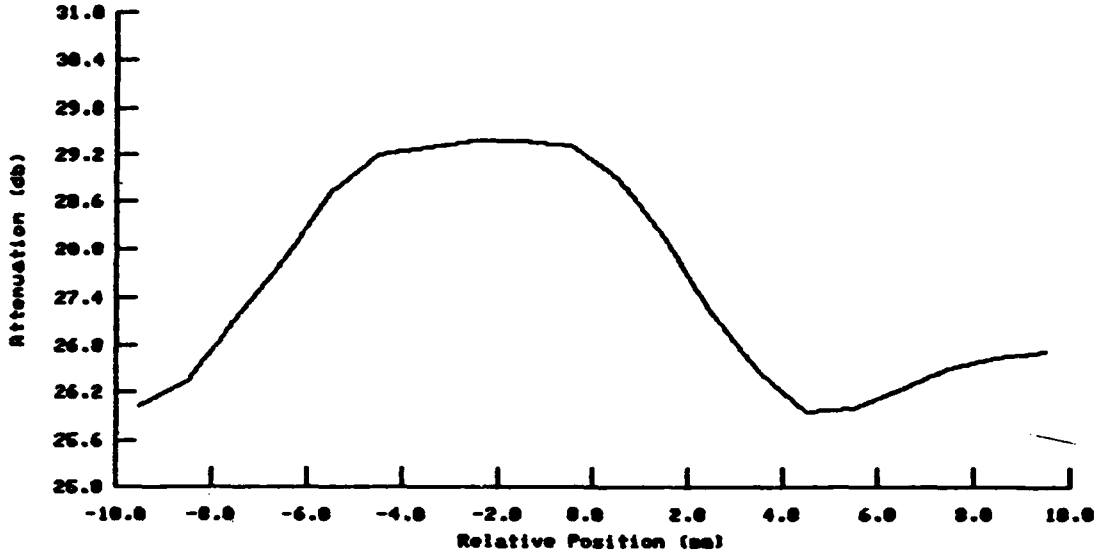
3.3 Giga-hertz O. D. tube

Figure 12



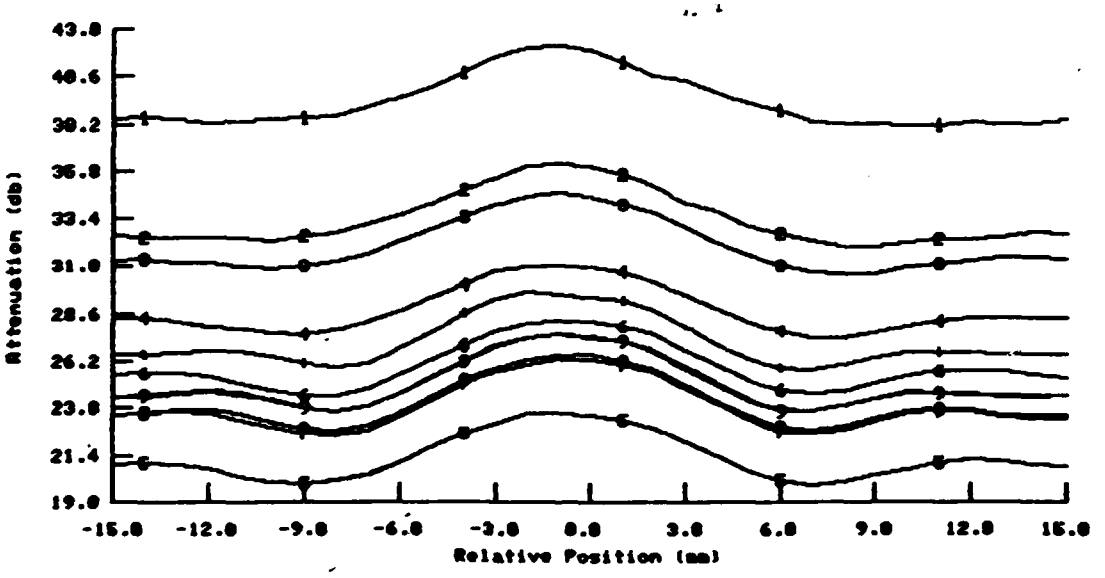
3.4 Giga-hertz 8mm O. D. tube

Figure 13



3.5 Giga-hertz 8mm O. D. tube

Figure 14



2.5 - 3.5 Giga-hertz 8mm O. D. tube

B. RASTER SCAN

The user has the capability of making a two dimensional (raster) scan. This is done as a series of line scans, with each one incremented in elevation. The equipment is capable of a range of elevation of about 195 mm and a range of azimuth of about 155 mm.

The user is also capable of scanning over many frequencies during a raster scan. This is done by scanning over the frequencies at avery position of the raster scan. The possible range of frequencies is 2.5 to 3.5 Giga-hertz, with the limiting factor being the efficiency range of the antennae.

The user has the capability of measuring the attenuation of either the transmitted or the reflected wave in a raster scan. The main difference between the two is that the reflected wave has much more attenuation.

The position, attenuation, and phase are stored in a disc file at every position. At the end of every line scan, the elevation and frequency are recorded. If a frequency scan is taken, each line scan is recorded separately for each frequency. Thus each record on disc consists of a line scan. For any type of scan the record format on disc is the same.

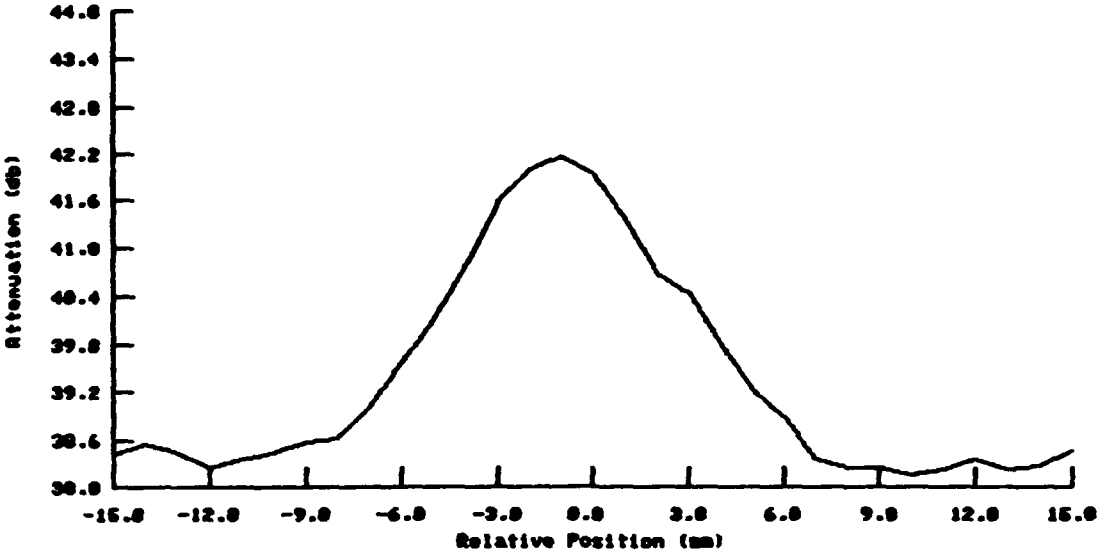
The user has the capability of displaying the data in various ways during a raster scan. He can have the frequency, azimuth, attenuation, and phase listed on a printer. He can have graphs of the attenuation plotted on the CRT or on a hard copy plotter. A graph plotted on the CRT can be copied onto a different hard copy plotter. One line scan is plotted per graph. Thus, if a frequency scan is done, a graph will contain plots of all the frequencies scanned. Figure 14 shows such a graph of a line scan with 11 frequencies plotted. Each line has its own marker with the first 1 to 9 frequencies marked with a "1" to "9" respectively. The tenth line is marked with a "." and the eleventh with "+". If the user later decides he wants to look more closely at a graph of one frequency, he can retrieve the data from the disc file and have a single frequency plotted. Figures 15 to 25 show the output of the raster scan program for one line. Since the object being scanned is a uniform tube, the other 63 line scans are similar to these graphs.

The user also has the capability of taking reflection scans in the same manner as transmission scans are taken. The data is similar to the transmission data except that the reflection attenuation is much greater.

The user also has the capability of repeating each measurement several times for statistical averaging. If a frequency scan is done, a frequency scan is completed and then repeated for the statistical number of times and then the antennae are moved on to the next position. This method provides the greatest time between measurements of the same frequency while keeping the time per scan to a minimum.

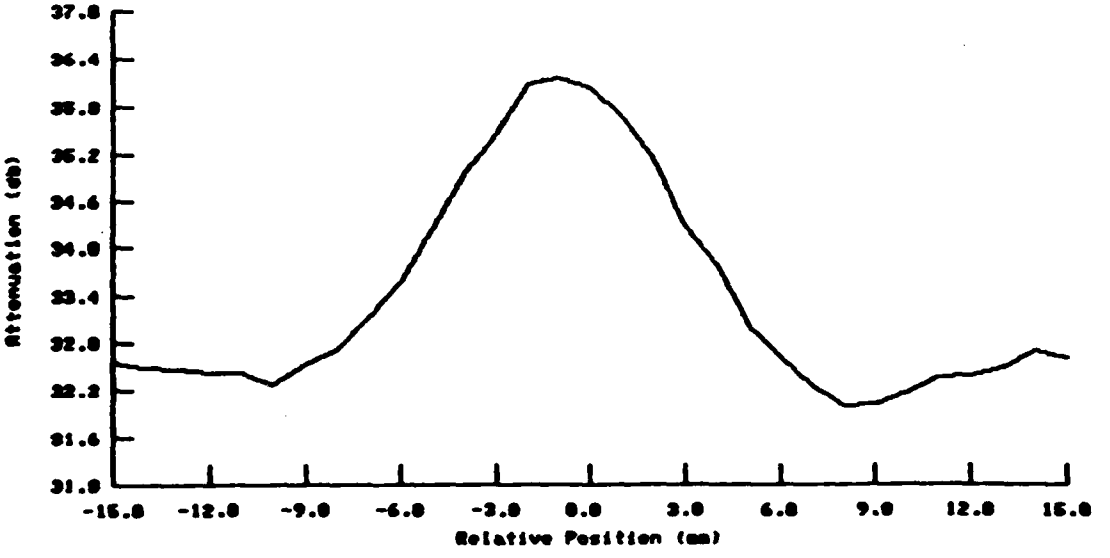
Since a raster scan consists of many line scans, the beginning position is not reset for each line scan. Instead, every other line scan moves in the opposite direction.

Figure 15



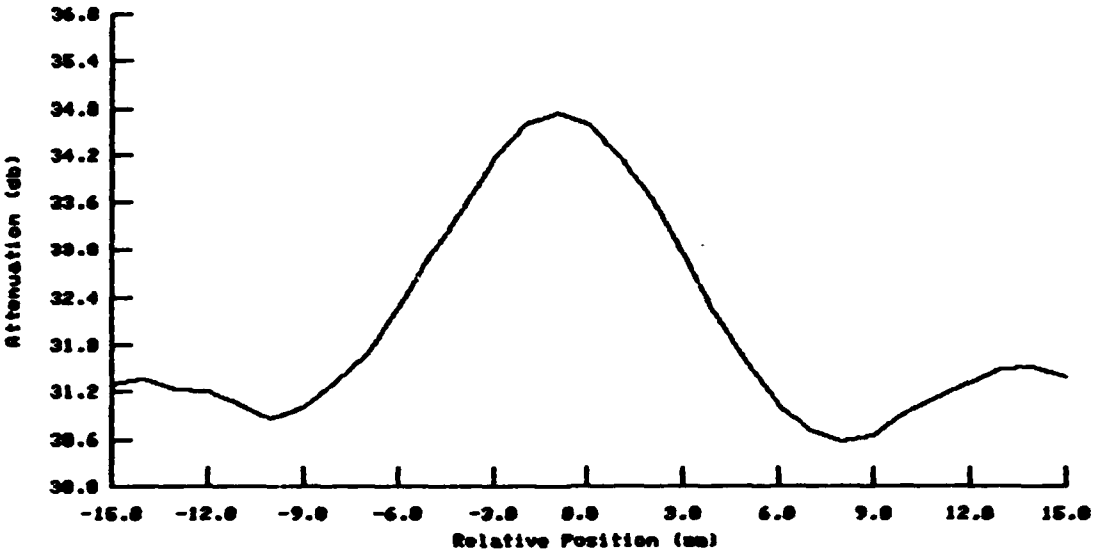
2.5 Giga-hertz 8mm O. D. tube

Figure 16



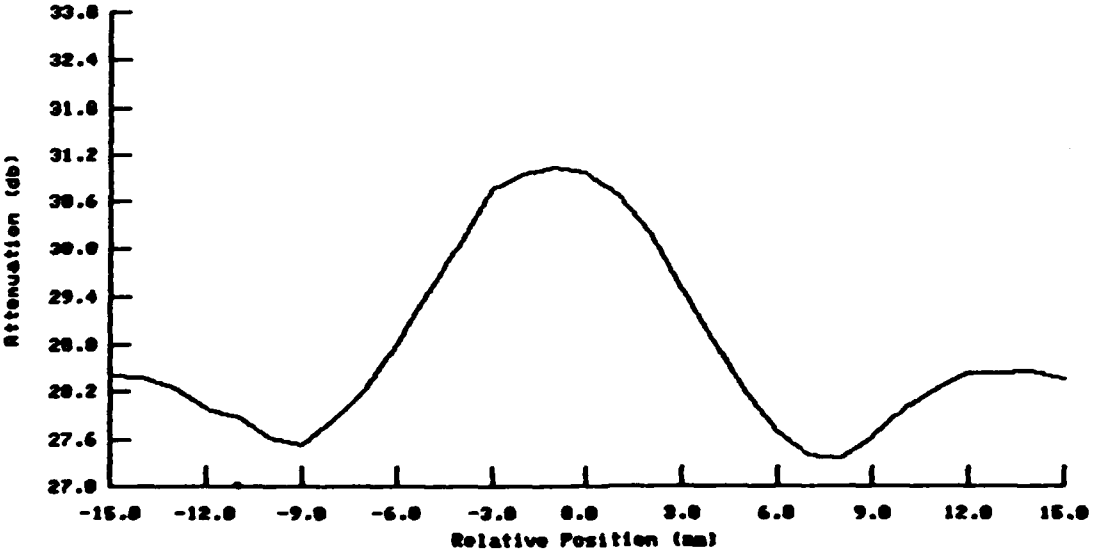
2.6 Giga-hertz 8mm O. D. tube

Figure 17



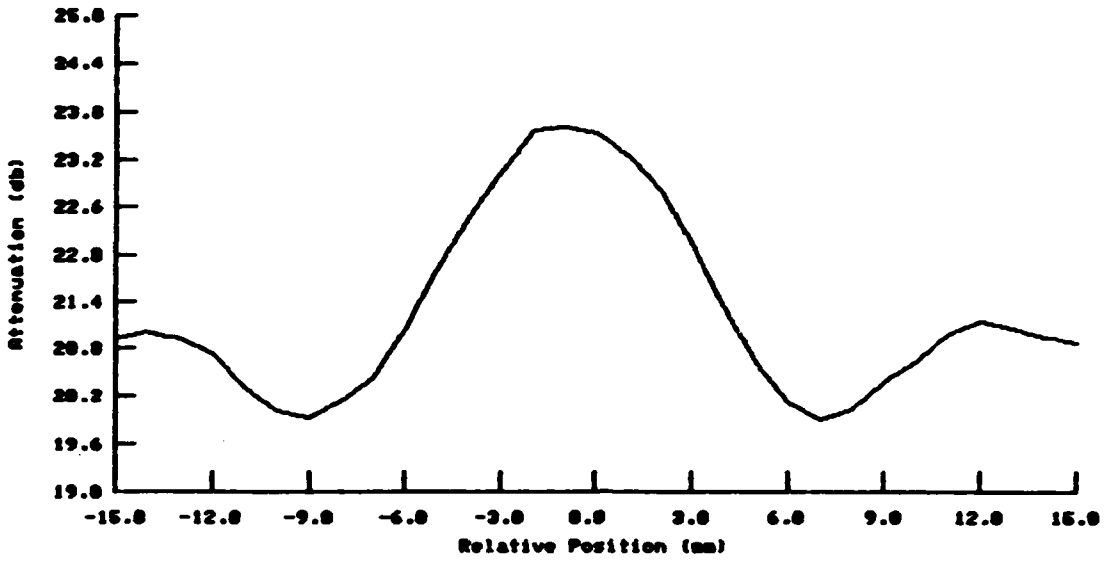
2.7 Giga-hertz 8mm O. D. tube

Figure 18



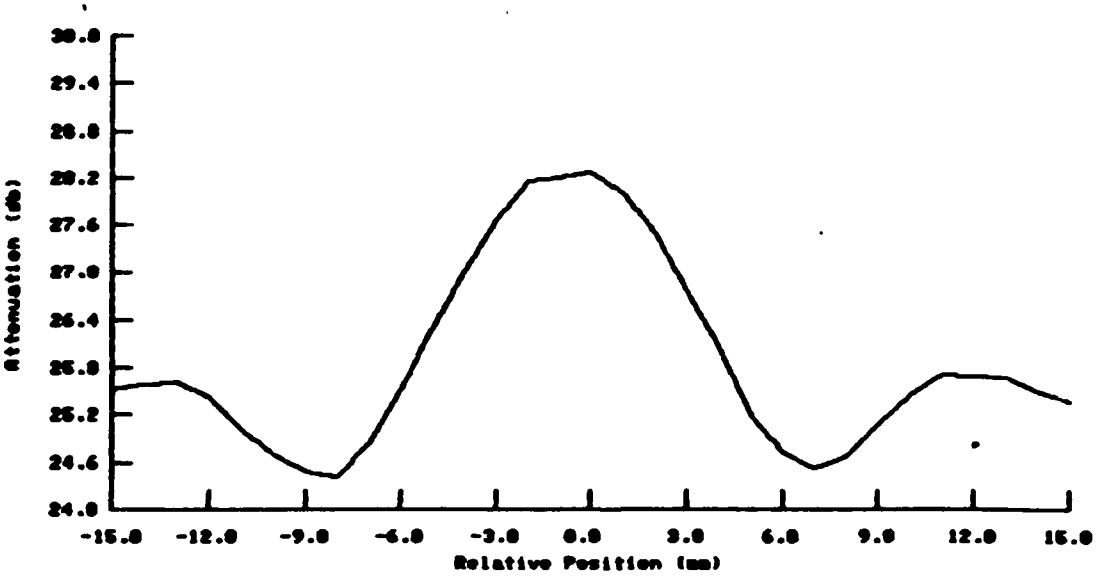
2.8 Giga-hertz 8mm O. D. tube

Figure 19



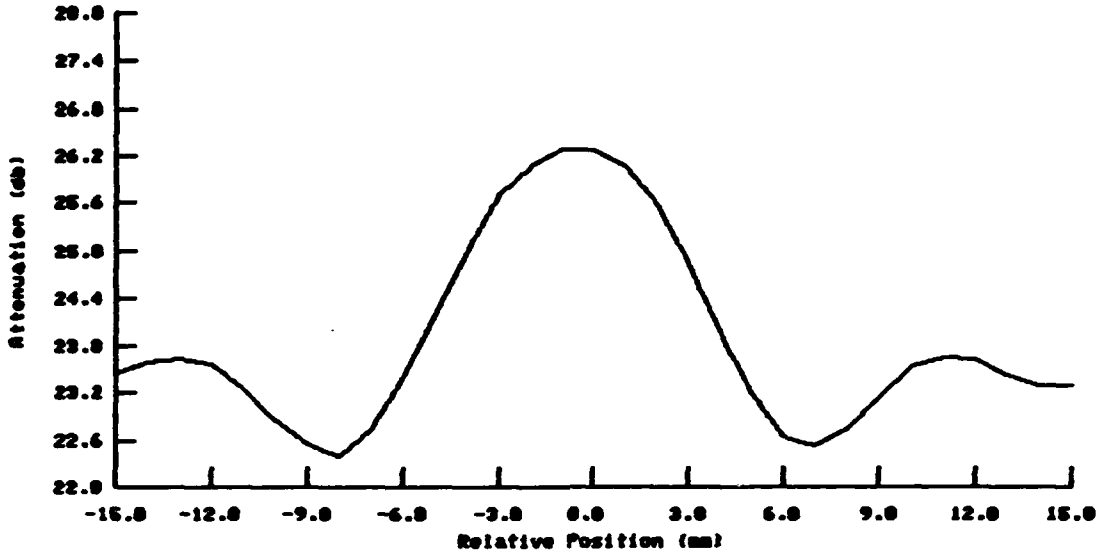
2.9 Giga-hertz 8mm O. D. tube

Figure 20



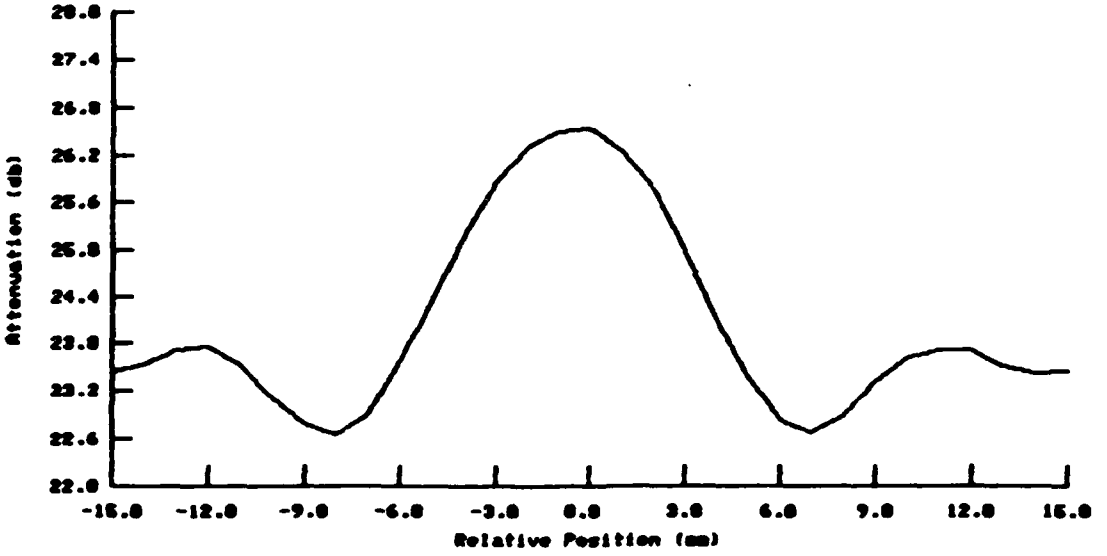
3.0 Giga-hertz 8mm O. D. tube

Figure 21



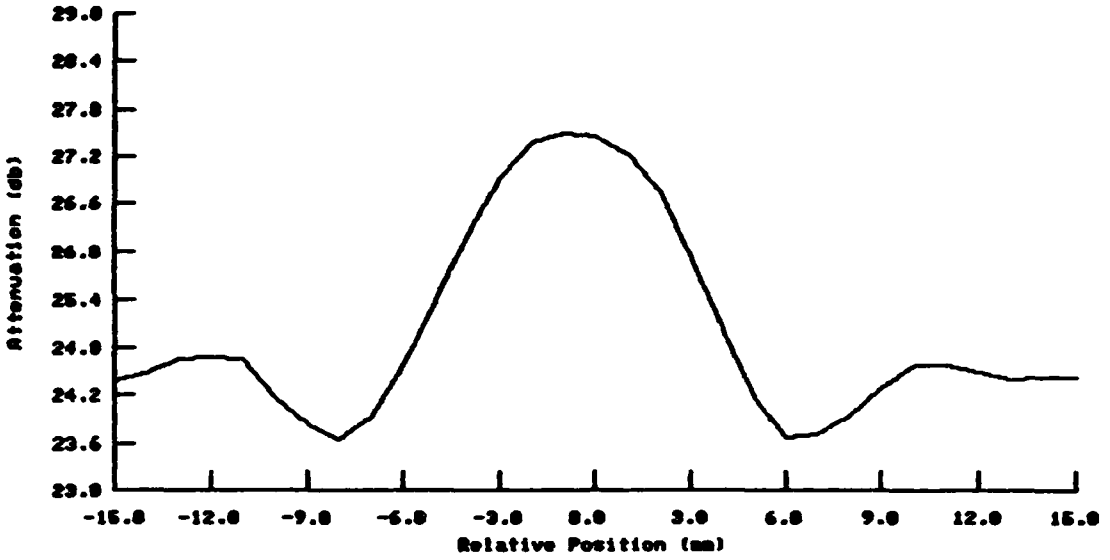
3.1 Giga-hertz 8mm O. D. tube

Figure 22



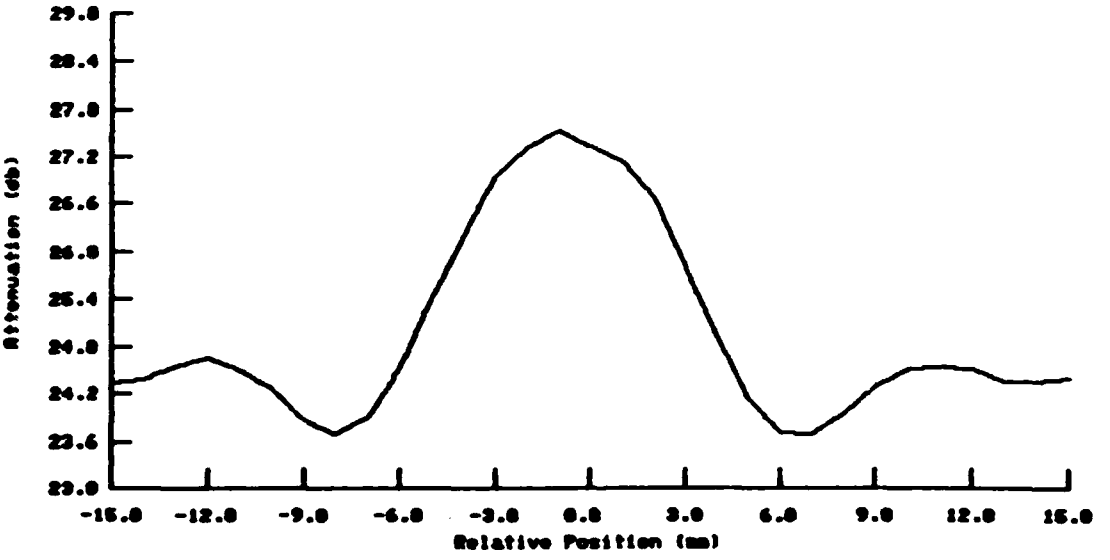
3.2 Giga-hertz 8mm O. D. tube

Figure 23



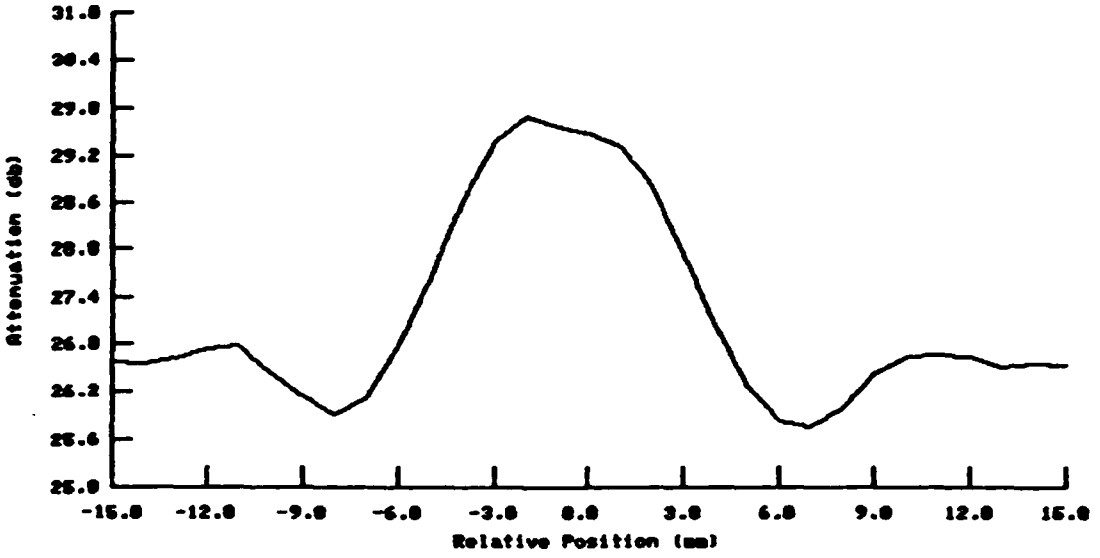
3.3 Giga-hertz 8mm O. D. tube

Figure 24



3.4 Giga-hertz 8mm O. D. tube

Figure 25



3.5 Giga-hertz 8mm O. D. tube

C. ROTATION AND TRANSLATION

The user has the capability of making a linear scan coupled with a rotational scan. These are done as a series of line scans, each one at a slightly different angle. The equipment is capable of a maximum rotation of 190 degrees. If the user starts the scan at the endpoint of this range, he can scan over the full range of 190 degrees.

The transmission attenuation is measured and stored in a disc file along with the position and phase at every data point. At the end of every line scan the angle and frequency are recorded before changing the angle.

The user has the capability of displaying the data in various ways during the scan. He can have the position, attenuation and phase recorded on a printer. He can have graphs of the attenuation plotted on the CRT or on a hard copy plotter. A graph plotted on the CRT can be copied onto a different hard copy plotter. The user has the capability of plotting only every nth line scan, where n can be any integer from 1 up to the number of scans. Before any graphs are plotted on the CRT, the position, attenuation, and phase are listed on the CRT. Thus the user has the capability of checking the data as soon as it is taken.

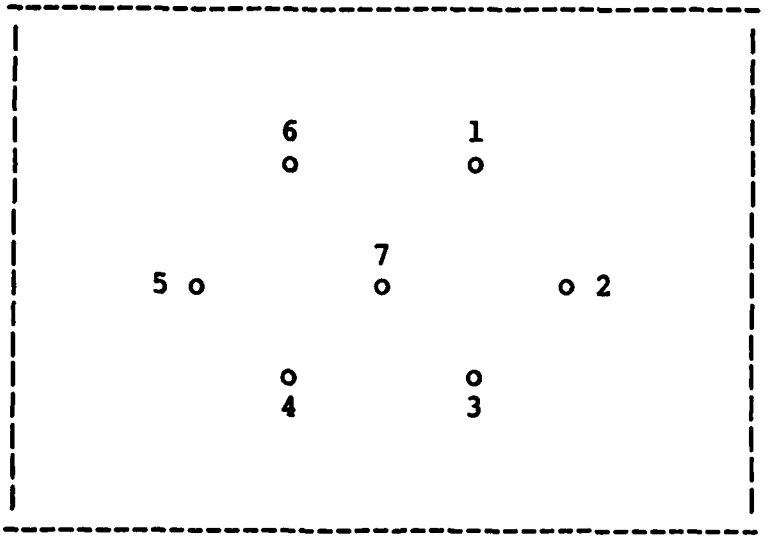
The user has the capability of repeating the measurement any number of times at each data point for the purpose of statistical averaging. When more than one measurement is taken per data point, the averaging is done before any data is recorded in the disc file or on the printer or plotted so that there is only one value of attenuation and phase recorded at each position. The fact that many measurements were averaged to arrive at each recorded value is recorded at the beginning of the file.

Since many line scans can be done at many angles, the time involved can be quite long. Therefore after a line scan is finished and the angle is incremented, the azimuth position is not reset to the same position where the last line scan started. Instead, every other line scan moves in the opposite direction so that no resetting is necessary.

D. Antenna Subarray Verification

A seven element subarray of the much larger array was fabricated and tested for the purpose of verifying the antenna design. Two programs were written to make the required measurements. The first program measured the VSWR of each element when driven from a 50 Ohm source. The second program measured the coupling between various elements in the subarray.

The data presented on the following pages was collected with the subarray mounted on the water loaded scanner. The subarray was positioned approximately twelve inches below the surface of the water. The numbering for the elements of the subarray and their relative position is shown in figure 6.



Subarray Element Identification

Figure 6

Walter Reed Army Institute of Research
Department of Microwave Research
Walter Reed Army Medical Center
Washington, DC 20012

SUBARRAY VERIFICATION
ELEMENT # 1

Measurement Date: 12:50 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.5946	118.7	3.933	4.516
2050.000	.5684	-90.2	3.634	4.907
2100.000	.5683	58.9	3.632	4.909
2150.000	.5124	-151.0	3.102	5.808
2200.000	.5215	-.8	3.180	5.654
2250.000	.4594	150.1	2.700	6.755
2300.000	.4390	-52.4	2.565	7.151
2350.000	.4149	84.6	2.418	7.641
2400.000	.3665	-102.1	2.157	8.718
2450.000	.3738	35.3	2.194	8.548
2500.000	.3190	-165.7	1.937	9.924
2550.000	.3213	-15.5	1.947	9.862
2600.000	.2687	130.7	1.735	11.415
2650.000	.2479	-63.8	1.659	12.116
2700.000	.2149	85.2	1.547	13.357
2750.000	.1816	-114.1	1.444	14.816
2800.000	.1842	44.0	1.452	14.693
2850.000	.1419	-150.1	1.331	16.960
2900.000	.1646	-.9	1.394	15.673
2950.000	.1273	174.6	1.292	17.905
3000.000	.1690	-29.2	1.407	15.443
3050.000	.1493	132.5	1.351	16.519
3100.000	.1970	-65.5	1.491	14.112
3150.000	.2018	80.8	1.506	13.901
3200.000	.2218	-106.6	1.570	13.079
3250.000	.2435	35.3	1.644	12.272
3300.000	.2516	-162.5	1.673	11.984
3350.000	.2988	-11.3	1.852	10.494
3400.000	.2865	140.4	1.803	10.859
3450.000	.3425	-67.9	2.042	9.308
3500.000	.3308	77.4	1.989	9.609
3550.000	.3680	-127.4	2.165	8.682
3600.000	.3750	28.5	2.200	8.518
3650.000	.3724	177.6	2.187	8.580
3700.000	.4281	-27.3	2.497	7.368
3750.000	.4021	124.7	2.345	7.912
3800.000	.4450	-83.2	2.604	7.033
3850.000	.4453	60.8	2.605	7.027
3900.000	.4306	-141.6	2.513	7.318
3950.000	.4664	4.7	2.748	6.624
3999.999	.4445	166.7	2.600	7.043

Walter Reed Army Institute of Research
Department of Microwave Research
Walter Reed Army Medical Center
Washington, DC 20012

SUBARRAY VERIFICATION
ELEMENT # 2

Measurement Date: 12:52 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.3957	81.7	2.310	8.052
2050.000	.3645	-117.5	2.147	8.766
2100.000	.4054	35.4	2.363	7.843
2150.000	.3813	-171.8	2.233	8.374
2200.000	.4345	-19.7	2.537	7.240
2250.000	.4084	128.8	2.381	7.778
2300.000	.4143	-72.5	2.414	7.655
2350.000	.4199	61.8	2.447	7.538
2400.000	.3725	-126.7	2.187	8.577
2450.000	.4013	10.5	2.340	7.931
2500.000	.3460	169.2	2.058	9.218
2550.000	.3736	-42.0	2.193	8.552
2600.000	.3216	101.7	1.948	9.853
2650.000	.3166	-93.7	1.927	9.990
2700.000	.2936	50.5	1.831	10.644
2750.000	.2575	-150.4	1.694	11.785
2800.000	.2729	4.7	1.751	11.281
2850.000	.2133	161.8	1.542	13.420
2900.000	.2471	-52.2	1.656	12.143
2950.000	.2010	109.7	1.503	13.935
3000.000	.2293	-89.2	1.595	12.793
3050.000	.2033	52.1	1.510	13.838
3100.000	.2087	-131.7	1.528	13.609
3150.000	.2254	4.7	1.582	12.942
3200.000	.2031	-174.4	1.510	13.845
3250.000	.2563	-32.6	1.689	11.826
3300.000	.2035	125.8	1.511	13.830
3350.000	.2722	-74.4	1.748	11.301
3400.000	.2361	66.5	1.618	12.539
3450.000	.2828	-123.6	1.789	10.969
3500.000	.2984	11.9	1.858	10.505
3550.000	.2820	175.8	1.786	10.995
3600.000	.3435	-31.8	2.046	9.282
3650.000	.2987	115.5	1.852	10.496
3700.000	.3669	-85.3	2.159	8.708
3750.000	.3367	63.1	2.015	9.454
3800.000	.3785	-139.3	2.218	8.448
3850.000	.3932	1.5	2.296	8.108
3900.000	.3752	157.5	2.201	8.514
3950.000	.4318	-53.2	2.520	7.294
3999.999	.3995	105.1	2.331	7.969

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Washington, DC 20012

SUBARRAY VERIFICATION
ELEMENT # 3

Measurement Date: 12:53 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.6463	85.7	4.655	3.791
2050.000	.3384	180.0	2.023	9.412
2100.000	.6106	27.0	4.136	4.285
2150.000	.5668	173.0	3.616	4.932
2200.000	.5684	-35.1	3.634	4.907
2250.000	.5335	111.3	3.288	5.457
2300.000	.4879	-92.8	2.905	6.234
2350.000	.4782	44.8	2.833	6.408
2400.000	.4006	-150.2	2.336	7.946
2450.000	.4075	-9.1	2.376	7.797
2500.000	.3401	146.8	2.031	9.369
2550.000	.3457	-61.6	2.057	9.225
2600.000	.2870	80.1	1.805	10.844
2650.000	.2596	-114.9	1.701	11 712
2700.000	.2390	29.5	1.628	12.430
2750.000	.1758	-170.4	1.427	15.099
2800.000	.1929	-15.3	1.478	14.295
2850.000	.1196	141.1	1.272	18.443
2900.000	.1458	-61.9	1.341	16.724
2950.000	.0990	100.9	1.220	20.090
3000.000	.1280	-85.7	1.294	17.853
3050.000	.1043	63.7	1.233	19.637
3100.000	.1311	-111.0	1.302	17.646
3150.000	.1425	25.3	1.332	16.921
3200.000	.1510	-149.3	1.356	16.420
3250.000	.1936	-11.9	1.480	14.260
3300.000	.1733	152.5	1.419	15.222
3350.000	.2412	-54.8	1.636	12.352
3400.000	.2132	91.1	1.542	13.425
3450.000	.2739	-107.8	1.754	11.249
3500.000	.2816	30.8	1.784	11.008
3550.000	.2937	-170.9	1.832	10.641
3600.000	.3431	-18.1	2.045	9.291
3650.000	.3155	129.4	1.922	10.019
3700.000	.3724	-73.7	2.187	8.579
3750.000	.3555	74.6	2.103	8.983
3800.000	.3949	-130.4	2.305	8.071
3850.000	.4078	12.0	2.378	7.790
3900.000	.3939	165.2	2.300	8.091
3950.000	.4457	-45.8	2.608	7.018
3999.999	.4197	113.2	2.446	7.542

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SUBARRAY VERIFICATION
ELEMENT # 4

Measurement Date: 12:54 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.6499	92.2	4.712	3.743
2050.000	.6037	-113.5	4.046	4.384
2100.000	.6259	33.6	4.347	4.069
2150.000	.5657	-178.1	3.606	4.948
2200.000	.5894	-25.9	3.871	4.592
2250.000	.5332	118.0	3.285	5.462
2300.000	.4979	-81.7	2.984	6.056
2350.000	.4888	50.5	2.906	6.231
2400.000	.3964	-139.2	2.314	8.037
2450.000	.4216	-1.8	2.458	7.502
2500.000	.3276	153.6	1.974	9.694
2550.000	.3507	-52.5	2.080	9.101
2600.000	.2744	83.1	1.756	11.232
2650.000	.2454	-102.9	1.651	12.201
2700.000	.2263	32.6	1.585	12.907
2750.000	.1426	-153.5	1.333	16.915
2800.000	.1786	-6.3	1.435	14.963
2850.000	.0810	162.4	1.176	21.835
2900.000	.1444	-39.6	1.337	16.811
2950.000	.0692	125.7	1.149	23.194
3000.000	.1511	-58.4	1.356	16.415
3050.000	.1001	85.4	1.222	19.995
3100.000	.1719	-89.3	1.415	15.295
3150.000	.1688	38.8	1.406	15.453
3200.000	.1820	-131.7	1.445	14.798
3250.000	.2321	-3.4	1.605	12.686
3300.000	.1891	165.8	1.467	14.464
3350.000	.2807	-45.6	1.781	11.035
3400.000	.2241	99.6	1.578	12.993
3450.000	.3031	-100.2	1.870	10.367
3500.000	.2956	35.5	1.839	10.585
3550.000	.3023	-158.0	1.866	10.393
3600.000	.3490	-10.9	2.072	9.143
3650.000	.2971	140.9	1.846	10.541
3700.000	.3824	-63.2	2.238	8.351
3750.000	.3318	85.1	1.993	9.584
3800.000	.3925	-116.7	2.292	8.123
3850.000	.3938	21.8	2.299	8.095
3900.000	.3718	-178.0	2.184	8.594
3950.000	.4352	-32.7	2.541	7.227
3999.999	.3845	129.0	2.249	8.302

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SUBARRAY VERIFICATION
ELEMENT # 5

Measurement Date: 12:57 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.5703	90.1	3.655	4.878
2050.000	.5009	-114.6	3.007	6.005
2100.000	.5175	33.2	3.145	5.722
2150.000	.4250	-178.3	2.478	7.432
2200.000	.4553	-22.2	2.672	6.835
2250.000	.3803	122.8	2.227	8.397
2300.000	.3690	-78.6	2.170	8.658
2350.000	.3641	60.8	2.145	8.776
2400.000	.2921	-120.4	1.825	10.691
2450.000	.3358	14.8	2.011	9.479
2500.000	.2393	173.7	1.629	12.423
2550.000	.2934	-29.7	1.830	10.652
2600.000	.2173	108.7	1.555	13.259
2650.000	.2200	-75.2	1.564	13.153
2700.000	.1974	61.3	1.492	14.094
2750.000	.1555	-120.3	1.368	16.163
2800.000	.1906	27.0	1.471	14.396
2850.000	.1205	-157.8	1.274	18.382
2900.000	.1926	-14.4	1.477	14.308
2950.000	.1220	153.2	1.278	18.274
3000.000	.2100	-46.7	1.532	13.555
3050.000	.1616	101.7	1.385	15.834
3100.000	.2295	-84.7	1.596	12.785
3150.000	.2348	49.5	1.614	12.586
3200.000	.2388	-130.8	1.627	12.448
3250.000	.2935	3.6	1.831	10.647
3300.000	.2543	165.4	1.682	11.893
3350.000	.3401	-41.8	2.031	9.369
3400.000	.2931	101.6	1.829	10.659
3450.000	.3680	-94.8	2.164	8.684
3500.000	.3723	39.5	2.186	8.581
3550.000	.3681	-158.6	2.165	8.680
3600.000	.4209	-7.8	2.453	7.517
3650.000	.3748	140.0	2.199	8.523
3700.000	.4442	-61.6	2.598	7.049
3750.000	.4163	84.8	2.426	7.613
3800.000	.4496	-117.2	2.634	6.943
3850.000	.4715	22.8	2.784	6.531
3900.000	.4318	178.6	2.520	7.295
3950.000	.4980	-31.8	2.984	6.056
3999.999	.4493	125.4	2.632	6.958

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SUBARRAY VERIFICATION
ELEMENT # 6

Measurement Date: 12:58 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.6584	90.3	4.721	3.736
2050.000	.6108	-113.2	4.138	4.283
2100.000	.6327	32.1	4.445	3.976
2150.000	.5691	-127.1	3.641	4.897
2200.000	.6053	-26.4	4.067	4.360
2250.000	.5409	119.0	3.357	5.337
2300.000	.5214	-88.7	3.179	5.656
2350.000	.5064	50.9	3.052	5.910
2400.000	.4248	-136.5	2.477	7.436
2450.000	.4518	-1.3	2.648	6.901
2500.000	.3598	157.2	2.124	8.888
2550.000	.3985	-51.9	2.325	7.991
2600.000	.3152	86.8	1.921	10.028
2650.000	.3042	-102.6	1.875	10.336
2700.000	.2789	32.3	1.774	11.090
2750.000	.2051	-157.5	1.516	13.760
2800.000	.2391	-13.3	1.629	12.428
2850.000	.1316	146.5	1.303	17.615
2900.000	.1895	-60.7	1.468	14.449
2950.000	.0984	91.4	1.218	20.138
3000.000	.1505	-86.2	1.354	16.451
3050.000	.0980	44.6	1.217	20.178
3100.000	.1300	-105.5	1.299	17.724
3150.000	.1319	12.8	1.304	17.592
3200.000	.1365	-136.7	1.316	17.296
3250.000	.1855	-14.1	1.456	14.632
3300.000	.1402	169.2	1.326	17.067
3350.000	.2375	-50.3	1.623	12.485
3400.000	.1723	99.6	1.416	15.273
3450.000	.2795	-97.1	1.776	11.073
3500.000	.2527	34.9	1.676	11.948
3550.000	.2875	-154.4	1.807	10.827
3600.000	.3202	-13.0	1.942	9.893
3650.000	.2887	143.3	1.812	10.790
3700.000	.3728	-65.5	2.189	8.571
3750.000	.3221	85.9	1.958	9.840
3800.000	.3990	-119.1	2.328	7.988
3850.000	.3857	19.8	2.256	8.276
3900.000	.3828	-179.7	2.241	8.340
3950.000	.4344	-37.4	2.536	7.242
3999.999	.3935	127.2	2.297	8.102

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SUBARRAY VERIFICATION
ELEMENT # 7

Measurement Date: 12:59 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.4708	98.1	2.773	6.558
2050.000	.4580	-113.8	2.690	6.783
2100.000	.4498	42.1	2.635	6.940
2150.000	.4486	-169.4	2.627	6.964
2200.000	.4394	-19.2	2.568	7.143
2250.000	.4264	134.9	2.487	7.404
2300.000	.4017	-74.6	2.343	7.923
2350.000	.3514	92.3	2.083	9.085
2400.000	.3611	-127.1	2.131	8.847
2450.000	.3383	15.4	2.023	9.413
2500.000	.3261	173.9	1.968	9.733
2550.000	.2983	-40.6	1.850	10.506
2600.000	.2684	112.3	1.734	11.426
2650.000	.2468	-93.6	1.655	12.152
2700.000	.2092	66.4	1.529	13.589
2750.000	.1982	-144.1	1.494	14.058
2800.000	.1675	23.1	1.402	15.521
2850.000	.1642	-177.4	1.393	15.691
2900.000	.1487	-30.1	1.349	16.556
2950.000	.1595	146.7	1.379	15.947
3000.000	.1715	-65.3	1.414	15.317
3050.000	.1698	105.0	1.409	15.400
3100.000	.2113	-103.3	1.536	13.503
3150.000	.2032	51.7	1.510	13.842
3200.000	.2444	-147.4	1.647	12.237
3250.000	.2469	.8	1.656	12.151
3300.000	.2805	158.7	1.780	11.043
3350.000	.2968	-49.9	1.844	10.550
3400.000	.3019	102.7	1.865	10.404
3450.000	.3463	-106.8	2.059	9.211
3500.000	.3461	39.6	2.059	9.216
3550.000	.3802	-168.2	2.227	8.401
3600.000	.3822	-11.5	2.237	8.354
3650.000	.3937	135.9	2.298	8.098
3700.000	.4143	-70.1	2.415	7.653
3750.000	.4163	85.6	2.426	7.613
3800.000	.4432	-127.9	2.592	7.067
3850.000	.4450	22.0	2.604	7.032
3900.000	.4540	171.3	2.663	6.860
3950.000	.4649	-37.2	2.737	6.654
3999.999	.4713	122.7	2.783	6.533

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SUBARRAY VERIFICATION
6 dB ATTENUATOR WITH SMA ADAPTORS

Measurement Date: 11:39 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.4966	.9	6.079
2050.000	.4965	-8.4	6.081
2100.000	.4976	-17.3	6.062
2150.000	.4976	-26.1	6.063
2200.000	.4935	-35.6	6.135
2250.000	.4937	-44.8	6.130
2300.000	.4964	-53.5	6.083
2350.000	.4907	-62.0	6.183
2400.000	.4885	-71.0	6.223
2450.000	.4922	-80.4	6.157
2500.000	.4932	-89.5	6.140
2550.000	.4954	-98.3	6.100
2600.000	.4929	-106.5	6.144
2650.000	.4902	-115.6	6.193
2700.000	.4919	-125.0	6.163
2750.000	.4980	-133.6	6.055
2800.000	.4978	-142.1	6.058
2850.000	.4952	-151.6	6.105
2900.000	.4975	-161.1	6.064
2950.000	.4979	-169.6	6.058
3000.000	.4962	-179.0	6.087
3050.000	.4956	172.0	6.098
3100.000	.4954	163.1	6.100
3150.000	.4938	154.4	6.129
3200.000	.4938	145.8	6.129
3250.000	.4929	136.6	6.145
3300.000	.4929	127.4	6.145
3350.000	.4935	118.2	6.135
3400.000	.4963	109.8	6.086
3450.000	.4933	100.9	6.138
3500.000	.4909	91.6	6.180
3550.000	.5005	82.0	6.012
3600.000	.5011	73.7	6.002
3650.000	.4978	64.5	6.073
3700.000	.4947	55.7	6.113
3750.000	.4953	46.7	6.102
3800.000	.4968	37.3	6.076
3850.000	.4964	28.2	6.083
3900.000	.4944	19.4	6.118
3950.000	.4937	10.3	6.130
3999.999	.4948	1.5	6.111

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 1 TO 2

Measurement Date: 11:42 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0032	-4.0	49.968
2050.000	.0037	137.6	48.549
2100.000	.0039	-84.3	48.104
2150.000	.0046	54.9	46.796
2200.000	.0050	-166.0	46.019
2250.000	.0056	-28.6	45.069
2300.000	.0060	113.1	44.419
2350.000	.0065	-117.3	43.750
2400.000	.0070	27.4	43.112
2450.000	.0073	158.8	42.702
2500.000	.0080	-60.6	41.897
2550.000	.0081	73.1	41.828
2600.000	.0086	-155.1	41.263
2650.000	.0086	-16.4	41.354
2700.000	.0086	120.0	41.314
2750.000	.0087	-107.0	41.214
2800.000	.0083	32.1	41.652
2850.000	.0081	165.6	41.832
2900.000	.0075	-66.2	42.475
2950.000	.0073	74.7	42.697
3000.000	.0067	-150.9	43.422
3050.000	.0063	-13.7	43.974
3100.000	.0057	122.8	44.839
3150.000	.0052	-102.6	45.655
3200.000	.0048	42.9	46.343
3250.000	.0042	177.3	47.486
3300.000	.0038	-43.7	48.438
3350.000	.0033	94.7	49.551
3400.000	.0029	-128.6	50.647
3450.000	.0025	9.0	52.086
3500.000	.0021	145.4	53.379
3550.000	.0019	-76.6	54.310
3600.000	.0016	70.3	55.990
3650.000	.0013	-150.9	57.474
3700.000	.0010	-5.5	59.850
3750.000	.0009	138.4	60.749
3800.000	.0008	-76.4	62.050
3850.000	.0007	62.3	63.504
3900.000	.0005	-147.1	65.635
3950.000	.0005	-5.1	66.260
3999.999	.0004	144.6	67.169

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 1 TO 3

Measurement Date: 11:44 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0016	142.8	55.843
2050.000	.0015	-89.4	56.318
2100.000	.0012	41.3	58.603
2150.000	.0012	176.2	58.694
2200.000	.0010	-48.6	60.047
2250.000	.0011	85.3	59.260
2300.000	.0009	-130.3	61.041
2350.000	.0008	-7.9	61.720
2400.000	.0008	142.6	61.930
2450.000	.0007	-89.0	63.447
2500.000	.0010	47.6	60.356
2550.000	.0008	-170.4	62.184
2600.000	.0008	-57.0	61.766
2650.000	.0008	87.0	62.166
2700.000	.0005	-145.2	65.469
2750.000	.0007	-17.3	63.034
2800.000	.0005	127.3	65.326
2850.000	.0004	-119.2	67.623
2900.000	.0005	24.9	65.558
2950.000	.0003	147.8	69.925
3000.000	.0003	-85.5	70.054
3050.000	.0002	65.3	72.373
3100.000	.0002	164.3	76.177
3150.000	.0001	-48.1	78.256
3200.000	.0001	53.2	81.517
3250.000	.0001	-148.6	81.096
3300.000	.0001	105.3	82.730
3350.000	.0001	85.2	84.090
3400.000	.0000	133.9	89.200
3450.000	.0000	-112.8	91.249
3500.000	.0001	3.6	85.727
3550.000	.0000	165.2	86.215
3600.000	.0000	33.0	100.708
3650.000	.0000	-10.3	87.401
3700.000	.0001	-174.5	83.135
3750.000	.0001	-23.5	81.749
3800.000	.0000	36.1	90.788
3850.000	.0000	-168.7	92.239
3900.000	.0001	-5.8	83.281
3950.000	.0000	-42.3	88.205
3999.999	.0000	-144.9	104.294

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 1 TO 4

Measurement Date: 11:46 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21 Magnitude	S21 Phase	Insertion Loss (dB)
2000.000	.0011	-163.9	59.110
2050.000	.0010	-42.8	59.865
2100.000	.0007	79.3	63.421
2150.000	.0006	-144.4	64.965
2200.000	.0004	-5.2	67.697
2250.000	.0004	121.9	68.835
2300.000	.0003	-91.2	71.298
2350.000	.0008	103.8	94.408
2400.000	.0001	-62.6	82.244
2450.000	.0003	43.6	70.575
2500.000	.0003	-171.1	71.875
2550.000	.0003	-51.2	70.793
2600.000	.0004	94.9	68.525
2650.000	.0004	-121.1	67.951
2700.000	.0005	-6.0	65.494
2750.000	.0005	125.9	66.009
2800.000	.0004	-107.6	68.076
2850.000	.0006	35.7	65.122
2900.000	.0004	156.6	67.317
2950.000	.0004	-70.5	67.748
3000.000	.0004	66.6	67.551
3050.000	.0003	-166.7	69.357
3100.000	.0003	-28.2	69.528
3150.000	.0003	99.6	70.352
3200.000	.0003	-111.3	71.584
3250.000	.0002	11.4	72.366
3300.000	.0003	144.6	70.639
3350.000	.0002	-76.8	73.202
3400.000	.0002	51.9	74.164
3450.000	.0001	-159.3	77.831
3500.000	.0002	-21.1	76.419
3550.000	.0001	137.1	78.531
3600.000	.0000	-128.6	89.482
3650.000	.0001	-24.8	81.845
3700.000	.0001	166.3	80.697
3750.000	.0001	-60.8	79.596
3800.000	.0000	160.8	86.852
3850.000	.0000	156.2	94.577
3900.000	.0000	23.8	88.364
3950.000	.0001	28.0	84.121
3999.999	.0000	-104.6	86.204

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 1 TO 5

Measurement Date: 11:40 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0012	146.2	58.091
2050.000	.0011	-75.5	58.858
2100.000	.0010	55.1	59.587
2150.000	.0011	-175.9	58.937
2200.000	.0008	-43.5	61.656
2250.000	.0008	93.3	62.228
2300.000	.0007	-107.3	63.556
2350.000	.0007	12.8	62.716
2400.000	.0008	156.7	61.778
2450.000	.0006	-75.7	64.096
2500.000	.0008	62.2	61.756
2550.000	.0007	-152.2	63.087
2600.000	.0008	-38.6	62.049
2650.000	.0008	102.5	61.801
2700.000	.0006	-128.4	64.711
2750.000	.0007	-6.8	62.688
2800.000	.0006	145.6	64.965
2850.000	.0004	-95.2	67.046
2900.000	.0005	33.7	65.203
2950.000	.0003	159.3	69.782
3000.000	.0004	-78.2	68.516
3050.000	.0003	77.5	71.199
3100.000	.0002	172.0	75.667
3150.000	.0002	-17.6	74.172
3200.000	.0001	95.1	79.325
3250.000	.0001	-130.3	80.165
3300.000	.0001	89.0	82.214
3350.000	.0000	142.9	90.294
3400.000	.0000	-152.6	88.377
3450.000	.0000	160.8	104.649
3500.000	.0001	0.0	82.911
3550.000	.0000	172.8	89.097
3600.000	.0001	18.1	86.002
3650.000	.0001	5.1	82.181
3700.000	.0000	-168.3	86.196
3750.000	.0001	-72.6	82.980
3800.000	.0000	-142.3	87.085
3850.000	.0001	160.4	85.408
3900.000	.0000	14.3	90.294
3950.000	.0000	-33.5	91.203
3999.999	.0001	-68.9	83.619

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 1 TO 6

Measurement Date: 11:50 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0043	-18.7	47.429
2050.000	.0046	123.8	46.752
2100.000	.0005	-14.9	66.418
2150.000	.0052	43.9	45.750
2200.000	.0055	-176.0	45.218
2250.000	.0062	-40.1	44.122
2300.000	.0064	102.8	43.875
2350.000	.0068	-126.0	43.399
2400.000	.0074	20.9	42.673
2450.000	.0077	151.4	42.291
2500.000	.0084	-67.7	41.501
2550.000	.0082	66.9	41.676
2600.000	.0089	-161.4	41.057
2650.000	.0088	-21.3	41.130
2700.000	.0087	115.0	41.172
2750.000	.0088	-112.3	41.085
2800.000	.0082	27.4	41.686
2850.000	.0081	161.7	41.814
2900.000	.0074	-69.9	42.622
2950.000	.0071	71.2	42.964
3000.000	.0066	-154.3	43.635
3050.000	.0061	-16.7	44.302
3100.000	.0055	120.5	45.124
3150.000	.0050	-104.8	46.096
3200.000	.0044	40.8	47.141
3250.000	.0039	176.1	48.110
3300.000	.0034	-43.8	49.337
3350.000	.0029	94.3	50.719
3400.000	.0026	-128.3	51.703
3450.000	.0022	10.6	53.335
3500.000	.0018	146.6	54.909
3550.000	.0015	-71.0	56.522
3600.000	.0013	78.4	57.982
3650.000	.0010	-140.7	59.945
3700.000	.0008	5.4	61.654
3750.000	.0007	153.7	63.153
3800.000	.0006	-59.1	64.383
3850.000	.0006	80.2	64.970
3900.000	.0005	-127.5	66.046
3950.000	.0004	21.4	67.214
3999.999	.0004	171.9	67.706

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 1 TO 7

Measurement Date: 11:55 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0018	134.9	54.718
2050.000	.0019	-77.8	54.501
2100.000	.0018	77.5	55.071
2150.000	.0021	-134.1	53.718
2200.000	.0025	12.7	52.143
2250.000	.0028	158.5	51.030
2300.000	.0033	-53.9	49.675
2350.000	.0040	82.5	48.022
2400.000	.0045	-132.5	47.013
2450.000	.0052	-2.4	45.757
2500.000	.0056	141.3	45.084
2550.000	.0058	-84.9	44.745
2600.000	.0063	47.8	43.971
2650.000	.0063	-173.0	43.956
2700.000	.0063	-36.3	44.008
2750.000	.0064	97.0	43.873
2800.000	.0059	-121.6	44.528
2850.000	.0058	12.7	44.785
2900.000	.0053	141.9	45.512
2950.000	.0047	-76.1	46.470
3000.000	.0044	58.6	47.199
3050.000	.0039	-159.4	48.088
3100.000	.0034	-21.1	49.431
3150.000	.0031	115.8	50.118
3200.000	.0026	-94.7	51.781
3250.000	.0023	42.6	52.668
3300.000	.0021	-175.3	53.582
3350.000	.0017	-28.9	55.271
3400.000	.0016	108.7	55.936
3450.000	.0012	-105.9	58.261
3500.000	.0011	34.4	58.898
3550.000	.0010	179.9	60.138
3600.000	.0008	-26.3	62.229
3650.000	.0007	110.5	63.640
3700.000	.0006	-99.1	64.695
3750.000	.0005	52.7	66.744
3800.000	.0004	-157.5	67.115
3850.000	.0004	-10.4	68.141
3900.000	.0003	137.1	69.873
3950.000	.0004	-57.6	68.933
3999.999	.0003	90.6	71.254

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 2 TO 3

Measurement Date: 12:11 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21 Magnitude	S21 Phase	Insertion Loss (dB)
2000.000	.0039	118.0	48.121
2050.000	.0041	-101.4	47.642
2100.000	.0040	40.7	47.951
2150.000	.0044	-179.1	47.080
2200.000	.0045	-37.4	46.860
2250.000	.0048	101.2	46.321
2300.000	.0049	-111.7	46.164
2350.000	.0051	21.5	45.904
2400.000	.0055	168.5	45.271
2450.000	.0055	-57.3	45.212
2500.000	.0058	84.6	44.683
2550.000	.0058	-136.6	44.794
2600.000	.0061	-2.9	44.267
2650.000	.0060	138.7	44.460
2700.000	.0060	-82.8	44.450
2750.000	.0060	52.2	44.420
2800.000	.0056	-167.4	45.003
2850.000	.0056	-30.1	45.058
2900.000	.0051	99.4	45.855
2950.000	.0048	-119.5	46.338
3000.000	.0044	17.2	47.083
3050.000	.0041	155.9	47.757
3100.000	.0036	-65.8	48.783
3150.000	.0033	69.9	49.614
3200.000	.0029	-142.7	50.776
3250.000	.0026	-7.5	51.867
3300.000	.0023	134.5	52.752
3350.000	.0019	-84.3	54.604
3400.000	.0017	53.3	55.407
3450.000	.0013	-168.7	57.482
3500.000	.0011	-26.7	58.911
3550.000	.0010	116.0	60.097
3600.000	.0007	-92.0	62.531
3650.000	.0007	46.0	63.309
3700.000	.0006	-172.4	64.831
3750.000	.0005	-21.0	65.852
3800.000	.0004	125.7	68.543
3850.000	.0003	-82.6	69.141
3900.000	.0002	53.4	72.143
3950.000	.0002	-138.0	74.823
3999.999	.0002	14.9	73.033

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 2 TO 4

Measurement Date: 12:14 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0013	139.5	57.807
2050.000	.0013	-92.9	57.911
2100.000	.0010	30.5	59.580
2150.000	.0010	172.0	59.739
2200.000	.0009	-53.5	61.014
2250.000	.0010	73.6	59.711
2300.000	.0008	-143.2	61.692
2350.000	.0007	-21.2	62.513
2400.000	.0008	131.0	61.956
2450.000	.0007	-97.5	63.251
2500.000	.0009	34.5	60.957
2550.000	.0007	172.5	62.860
2600.000	.0007	-74.0	62.769
2650.000	.0007	71.5	62.580
2700.000	.0006	-156.9	65.119
2750.000	.0007	-32.5	63.608
2800.000	.0005	109.6	65.692
2850.000	.0004	-139.3	67.842
2900.000	.0005	1.5	66.784
2950.000	.0003	124.5	70.709
3000.000	.0004	-103.9	69.050
3050.000	.0002	61.0	72.527
3100.000	.0002	144.2	74.426
3150.000	.0001	-52.8	77.497
3200.000	.0001	48.2	80.580
3250.000	.0001	-171.4	80.909
3300.000	.0001	133.9	83.568
3350.000	.0000	21.9	87.375
3400.000	.0000	61.0	94.159
3450.000	.0000	-74.4	90.885
3500.000	.0000	-21.7	87.324
3550.000	.0001	163.6	83.776
3600.000	.0000	-152.7	88.536
3650.000	.0001	-24.2	79.464
3700.000	.0001	128.9	81.267
3750.000	.0001	-73.9	79.662
3800.000	.0000	59.1	86.929
3850.000	.0000	89.2	88.773
3900.000	.0000	-63.0	86.916
3950.000	.0001	31.2	80.806
3999.999	.0000	-93.3	87.060

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 2 TO 5

Measurement Date: 12:15 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0016	66.1	56.021
2050.000	.0019	-160.7	54.567
2100.000	.0016	-.8	56.083
2150.000	.0021	95.8	53.425
2200.000	.0020	-133.1	53.766
2250.000	.0020	-5.4	53.847
2300.000	.0021	133.8	53.515
2350.000	.0020	-103.7	53.919
2400.000	.0023	32.3	52.853
2450.000	.0021	161.2	53.378
2500.000	.0021	-67.8	53.502
2550.000	.0022	61.2	53.295
2600.000	.0021	-168.9	53.673
2650.000	.0021	-40.2	53.729
2700.000	.0020	96.7	53.998
2750.000	.0018	-139.4	55.011
2800.000	.0018	-5.7	54.886
2850.000	.0017	127.2	55.320
2900.000	.0015	-115.8	56.662
2950.000	.0015	23.7	56.552
3000.000	.0012	154.1	58.652
3050.000	.0001	-163.4	83.570
3100.000	.0011	60.2	59.162
3150.000	.0009	179.6	60.703
3200.000	.0009	-31.9	60.528
3250.000	.0007	89.9	63.146
3300.000	.0007	-138.9	63.188
3350.000	.0006	2.1	64.757
3400.000	.0005	123.9	65.940
3450.000	.0004	-95.8	67.479
3500.000	.0004	29.4	68.008
3550.000	.0004	172.0	69.023
3600.000	.0002	-44.9	73.367
3650.000	.0002	63.3	72.632
3700.000	.0002	-144.5	74.755
3750.000	.0002	-22.3	73.253
3800.000	.0001	135.7	79.225
3850.000	.0001	-147.1	85.927
3900.000	.0001	15.2	79.964
3950.000	.0001	-75.1	85.859
3999.999	.0000	-23.8	86.051

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 2 TO 6

Measurement Date: 12:17 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0021	166.0	53.754
2050.000	.0025	-59.5	52.017
2100.000	.0027	72.9	51.472
2150.000	.0032	-153.7	49.896
2200.000	.0035	-20.0	49.081
2250.000	.0041	107.9	47.684
2300.000	.0043	-115.5	47.239
2350.000	.0045	7.0	46.928
2400.000	.0049	146.9	46.258
2450.000	.0050	-87.2	45.975
2500.000	.0054	46.6	45.353
2550.000	.0053	175.6	45.522
2600.000	.0055	-56.9	45.150
2650.000	.0052	76.9	45.626
2700.000	.0053	-150.2	45.452
2750.000	.0052	-21.0	45.681
2800.000	.0050	111.0	45.998
2850.000	.0049	-115.5	46.228
2900.000	.0044	7.3	47.177
2950.000	.0045	142.9	46.974
3000.000	.0040	-85.7	47.906
3050.000	.0038	44.7	48.366
3100.000	.0035	178.8	49.131
3150.000	.0031	-51.5	50.256
3200.000	.0030	88.3	50.592
3250.000	.0016	-89.9	56.094
3300.000	.0023	-8.9	52.775
3350.000	.0020	126.3	53.820
3400.000	.0018	-104.6	54.963
3450.000	.0016	28.7	56.001
3500.000	.0013	160.6	57.913
3550.000	.0012	-64.6	58.500
3600.000	.0010	76.6	60.304
3650.000	.0008	-149.2	61.486
3700.000	.0007	-10.1	63.314
3750.000	.0006	126.9	64.763
3800.000	.0005	-91.6	65.633
3850.000	.0004	36.7	67.100
3900.000	.0003	-174.2	69.122
3950.000	.0003	-40.2	69.361
3999.999	.0003	110.9	71.915

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 2 TO 7

Measurement Date: 12:18 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0032	-18.3	49.980
2050.000	.0036	122.7	48.933
2100.000	.0042	-96.5	47.567
2150.000	.0047	38.7	46.503
2200.000	.0052	173.7	45.660
2250.000	.0056	-49.3	45.033
2300.000	.0059	90.7	44.628
2350.000	.0063	-138.3	43.953
2400.000	.0067	5.1	43.535
2450.000	.0069	135.4	43.230
2500.000	.0072	-82.5	42.822
2550.000	.0073	50.2	42.757
2600.000	.0077	-175.9	42.267
2650.000	.0076	-38.6	42.421
2700.000	.0075	98.3	42.478
2750.000	.0075	-128.9	42.501
2800.000	.0071	10.3	42.915
2850.000	.0070	144.6	43.040
2900.000	.0064	-87.1	43.874
2950.000	.0063	53.1	44.056
3000.000	.0058	-171.7	44.746
3050.000	.0053	-35.5	45.443
3100.000	.0049	101.4	46.164
3150.000	.0044	-124.7	47.129
3200.000	.0040	20.6	47.868
3250.000	.0035	155.8	49.095
3300.000	.0031	-67.0	50.161
3350.000	.0027	72.4	51.255
3400.000	.0024	-151.8	52.544
3450.000	.0020	-15.3	53.787
3500.000	.0017	123.0	55.430
3550.000	.0015	-99.7	56.380
3600.000	.0013	49.5	57.931
3650.000	.0010	-171.1	59.866
3700.000	.0008	-32.3	61.960
3750.000	.0007	117.1	63.200
3800.000	.0006	-99.1	64.468
3850.000	.0005	36.9	65.231
3900.000	.0004	-170.1	68.505
3950.000	.0004	-19.7	68.351
3999.999	.0003	127.3	70.269

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 3 TO 4

Measurement Date: 12:20 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0047	-37.3	46.512
2050.000	.0054	104.0	45.335
2100.000	.0054	-118.3	45.412
2150.000	.0061	18.0	44.245
2200.000	.0063	159.1	44.016
2250.000	.0069	-65.3	43.166
2300.000	.0073	78.1	42.718
2350.000	.0076	-153.7	42.374
2400.000	.0081	-7.6	41.832
2450.000	.0082	123.2	41.724
2500.000	.0088	-96.7	41.107
2550.000	.0086	38.1	41.280
2600.000	.0090	169.5	40.900
2650.000	.0088	-50.5	41.146
2700.000	.0085	86.2	41.394
2750.000	.0084	-140.5	41.464
2800.000	.0078	-.9	42.109
2850.000	.0078	133.8	42.197
2900.000	.0070	-97.7	43.082
2950.000	.0067	43.9	43.428
3000.000	.0062	179.6	44.191
3050.000	.0057	-42.7	44.884
3100.000	.0052	95.0	45.744
3150.000	.0046	-130.3	46.758
3200.000	.0042	16.1	47.518
3250.000	.0036	150.9	48.825
3300.000	.0033	-69.1	49.705
3350.000	.0028	71.8	51.035
3400.000	.0025	-152.0	52.009
3450.000	.0021	-13.0	53.401
3500.000	.0018	123.3	54.886
3550.000	.0016	-95.8	55.975
3600.000	.0013	54.7	57.482
3650.000	.0012	-167.4	58.676
3700.000	.0009	-20.1	61.135
3750.000	.0009	122.7	61.198
3800.000	.0007	-90.5	62.980
3850.000	.0006	51.2	64.834
3900.000	.0005	-163.4	66.194
3950.000	.0005	-13.6	66.115
3999.999	.0004	137.5	67.588

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 3 TO 5

Measurement Date: 12:21 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0027	155.9	51.415
2050.000	.0032	-70.4	49.935
2100.000	.0033	63.6	49.553
2150.000	.0037	-165.2	48.604
2200.000	.0039	-29.8	48.108
2250.000	.0044	102.5	47.040
2300.000	.0048	-121.4	46.389
2350.000	.0050	3.0	46.093
2400.000	.0052	141.9	45.716
2450.000	.0054	-91.1	45.336
2500.000	.0057	43.7	44.852
2550.000	.0055	172.5	45.152
2600.000	.0058	-59.2	44.720
2650.000	.0055	74.3	45.266
2700.000	.0055	-152.1	45.179
2750.000	.0053	-22.6	45.518
2800.000	.0051	110.5	45.928
2850.000	.0049	-116.5	46.194
2900.000	.0044	7.5	47.142
2950.000	.0043	142.8	47.277
3000.000	.0039	-86.1	48.187
3050.000	.0036	46.5	48.804
3100.000	.0033	179.5	49.721
3150.000	.0029	-50.2	50.773
3200.000	.0026	89.8	51.606
3250.000	.0023	-136.9	52.732
3300.000	.0020	-3.4	53.919
3350.000	.0018	130.6	54.951
3400.000	.0015	-97.0	56.243
3450.000	.0013	34.9	57.412
3500.000	.0010	170.7	59.941
3550.000	.0009	-56.6	60.547
3600.000	.0008	85.2	61.672
3650.000	.0007	-131.8	63.682
3700.000	.0005	7.5	65.359
3750.000	.0004	145.6	67.156
3800.000	.0004	-72.3	68.981
3850.000	.0003	62.3	69.472
3900.000	.0003	-154.0	71.657
3950.000	.0003	-17.1	71.280
3999.999	.0002	147.5	73.401

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 3 TO 6

Measurement Date: 12:23 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0024	46.1	52.256
2050.000	.0027	-179.6	51.431
2100.000	.0025	-54.3	51.926
2150.000	.0029	72.4	50.699
2200.000	.0026	-155.9	51.759
2250.000	.0025	-29.6	51.993
2300.000	.0025	111.6	51.907
2350.000	.0024	-126.3	52.521
2400.000	.0026	12.5	51.812
2450.000	.0023	142.5	52.841
2500.000	.0023	-86.4	52.633
2550.000	.0023	44.6	52.767
2600.000	.0021	174.4	53.366
2650.000	.0022	-55.9	53.281
2700.000	.0020	80.5	53.982
2750.000	.0018	-153.5	54.740
2800.000	.0018	-19.1	54.766
2850.000	.0017	114.3	55.226
2900.000	.0015	-128.7	56.514
2950.000	.0015	12.3	56.493
3000.000	.0012	141.9	58.095
3050.000	.0012	-89.2	58.199
3100.000	.0011	50.9	59.392
3150.000	.0010	170.0	60.385
3200.000	.0009	-43.5	61.405
3250.000	.0007	83.0	63.334
3300.000	.0007	-151.4	63.023
3350.000	.0006	-8.3	64.933
3400.000	.0005	118.8	65.961
3450.000	.0003	-112.4	69.295
3500.000	.0003	25.1	69.655
3550.000	.0003	156.4	69.811
3600.000	.0002	-37.0	74.500
3650.000	.0002	59.4	74.835
3700.000	.0002	-149.2	74.364
3750.000	.0001	-18.1	80.079
3800.000	.0001	139.8	78.713
3850.000	.0001	-85.0	85.396
3900.000	.0001	40.9	81.558
3950.000	.0000	-132.7	93.228
3999.999	.0001	-70.6	83.697

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 3 TO 7

Measurement Date: 12:24 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0045	-35.7	46.886
2050.000	.0050	104.4	46.030
2100.000	.0053	-115.0	45.595
2150.000	.0059	21.2	44.642
2200.000	.0062	158.1	44.083
2250.000	.0065	-65.3	43.808
2300.000	.0067	76.3	43.532
2350.000	.0070	-150.6	43.137
2400.000	.0073	-6.7	42.764
2450.000	.0076	123.9	42.419
2500.000	.0077	-94.6	42.219
2550.000	.0078	39.8	42.199
2600.000	.0081	173.2	41.815
2650.000	.0079	-48.2	41.994
2700.000	.0078	89.3	42.152
2750.000	.0077	-137.2	42.290
2800.000	.0072	2.9	42.886
2850.000	.0071	137.1	42.963
2900.000	.0065	-93.1	43.728
2950.000	.0062	46.9	44.202
3000.000	.0057	-178.1	44.891
3050.000	.0052	-39.8	45.684
3100.000	.0048	96.7	46.443
3150.000	.0042	-127.8	47.495
3200.000	.0038	17.5	48.350
3250.000	.0033	153.0	49.624
3300.000	.0028	-68.0	50.936
3350.000	.0025	72.3	52.158
3400.000	.0021	-150.0	53.519
3450.000	.0019	-12.6	54.626
3500.000	.0015	125.0	56.770
3550.000	.0013	-94.3	57.871
3600.000	.0011	57.8	59.462
3650.000	.0008	-164.9	61.717
3700.000	.0006	-13.1	64.169
3750.000	.0005	137.7	65.510
3800.000	.0005	-77.9	65.797
3850.000	.0005	68.0	66.592
3900.000	.0004	-144.8	68.288
3950.000	.0004	5.8	68.980
3999.999	.0003	162.3	70.696

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 4 TO 5

Measurement Date: 12:27 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0041	-35.3	47.838
2050.000	.0044	109.2	47.159
2100.000	.0043	-110.4	47.370
2150.000	.0051	29.1	45.836
2200.000	.0053	168.5	45.459
2250.000	.0059	-55.3	44.598
2300.000	.0062	89.1	44.179
2350.000	.0066	-140.1	43.570
2400.000	.0073	5.2	42.759
2450.000	.0074	134.8	42.588
2500.000	.0080	-85.4	41.898
2550.000	.0079	49.5	42.101
2600.000	.0083	-179.8	41.570
2650.000	.0082	-40.0	41.685
2700.000	.0080	96.1	41.910
2750.000	.0080	-130.7	41.978
2800.000	.0074	8.4	42.611
2850.000	.0073	142.2	42.736
2900.000	.0066	-88.6	43.657
2950.000	.0063	51.4	44.070
3000.000	.0056	-173.5	45.051
3050.000	.0052	-35.6	45.620
3100.000	.0046	102.0	46.667
3150.000	.0041	-123.7	47.819
3200.000	.0037	23.6	48.704
3250.000	.0032	158.3	50.024
3300.000	.0028	-61.9	50.987
3350.000	.0023	80.4	52.641
3400.000	.0021	-144.3	53.633
3450.000	.0017	-3.4	55.214
3500.000	.0014	135.3	57.019
3550.000	.0012	-83.2	58.234
3600.000	.0011	66.2	59.545
3650.000	.0009	-153.6	61.340
3700.000	.0007	-3.6	63.481
3750.000	.0006	142.7	64.823
3800.000	.0005	-74.0	65.231
3850.000	.0005	75.7	66.540
3900.000	.0004	-134.3	67.998
3950.000	.0004	7.9	68.397
3999.999	.0001	-133.7	76.503

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 4 TO 6

Measurement Date: 12:28 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0014	126.3	56.985
2050.000	.0015	-99.3	56.447
2100.000	.0013	23.2	57.979
2150.000	.0012	149.9	58.119
2200.000	.0009	-77.6	60.932
2250.000	.0008	65.5	61.929
2300.000	.0007	-143.5	62.533
2350.000	.0008	-30.2	62.116
2400.000	.0008	121.2	62.338
2450.000	.0005	-116.3	65.577
2500.000	.0008	36.8	62.225
2550.000	.0006	179.9	64.087
2600.000	.0007	-75.7	62.766
2650.000	.0007	72.0	63.303
2700.000	.0004	-163.4	66.941
2750.000	.0006	-27.7	64.403
2800.000	.0005	125.0	66.105
2850.000	.0004	-133.5	68.779
2900.000	.0005	9.1	66.623
2950.000	.0003	131.1	71.548
3000.000	.0003	-94.5	70.785
3050.000	.0002	54.0	73.714
3100.000	.0002	160.8	75.873
3150.000	.0002	-38.8	75.185
3200.000	.0001	79.5	82.204
3250.000	.0001	-137.3	79.360
3300.000	.0001	106.9	78.237
3350.000	.0000	84.6	87.780
3400.000	.0000	39.3	88.305
3450.000	.0001	105.8	83.490
3500.000	.0001	12.7	83.905
3550.000	.0001	118.7	83.842
3600.000	.0000	-101.8	90.621
3650.000	.0000	-9.5	86.955
3700.000	.0001	174.4	83.562
3750.000	.0001	-75.4	85.368
3800.000	.0000	12.2	91.175
3850.000	.0000	131.6	89.181
3900.000	.0000	-58.2	88.485
3950.000	.0001	60.2	84.297
3999.999	.0001	-73.4	85.283

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 4 TO 7

Measurement Date: 12:25 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0019	123.9	54.556
2050.000	.0022	-89.5	53.329
2100.000	.0021	60.5	53.411
2150.000	.0024	-153.7	52.506
2200.000	.0028	-6.2	51.174
2250.000	.0033	139.0	49.554
2300.000	.0038	-77.4	48.360
2350.000	.0043	56.0	47.284
2400.000	.0048	-157.1	46.459
2450.000	.0054	-25.6	45.410
2500.000	.0060	115.9	44.466
2550.000	.0060	-109.7	44.501
2600.000	.0064	22.0	43.927
2650.000	.0064	163.0	43.944
2700.000	.0062	-60.6	44.142
2750.000	.0064	73.1	43.936
2800.000	.0058	-145.9	44.738
2850.000	.0056	-10.7	45.076
2900.000	.0052	119.1	45.675
2950.000	.0047	-99.1	46.620
3000.000	.0043	36.4	47.425
3050.000	.0038	178.2	48.375
3100.000	.0033	-43.1	49.599
3150.000	.0030	95.0	50.320
3200.000	.0026	-114.8	51.809
3250.000	.0023	21.2	52.814
3300.000	.0021	166.0	53.524
3350.000	.0017	-50.1	55.471
3400.000	.0016	89.0	55.956
3450.000	.0013	-126.9	57.530
3500.000	.0012	13.4	58.444
3550.000	.0010	157.9	59.644
3600.000	.0009	-47.4	61.373
3650.000	.0008	92.9	61.782
3700.000	.0007	-120.3	62.810
3750.000	.0006	28.6	64.062
3800.000	.0005	177.7	66.373
3850.000	.0005	-45.6	66.185
3900.000	.0004	102.1	67.386
3950.000	.0004	-91.8	68.892
3999.999	.0003	51.3	70.393

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 5 TO 6

Measurement Date: 12:29 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0044	115.4	47.098
2050.000	.0046	-98.3	46.812
2100.000	.0042	42.4	47.454
2150.000	.0048	-176.1	46.455
2200.000	.0045	-32.7	46.990
2250.000	.0049	108.4	46.200
2300.000	.0051	-101.1	45.928
2350.000	.0054	30.2	45.401
2400.000	.0058	178.0	44.683
2450.000	.0054	-25.1	45.367
2500.000	.0064	95.2	43.943
2550.000	.0063	-126.8	44.042
2600.000	.0067	6.0	43.483
2650.000	.0066	148.3	43.668
2700.000	.0065	-73.8	43.734
2750.000	.0066	61.9	43.671
2800.000	.0061	-158.1	44.279
2850.000	.0061	-20.6	44.356
2900.000	.0055	108.4	45.257
2950.000	.0052	-110.9	45.679
3000.000	.0046	25.0	46.669
3050.000	.0043	164.7	47.279
3100.000	.0037	-56.6	48.582
3150.000	.0034	77.9	49.417
3200.000	.0029	-132.8	50.738
3250.000	.0025	2.7	52.116
3300.000	.0023	145.2	52.856
3350.000	.0018	-72.6	55.014
3400.000	.0016	65.0	56.107
3450.000	.0012	-150.7	58.298
3500.000	.0011	-11.8	59.495
3550.000	.0009	138.1	61.118
3600.000	.0007	-69.8	63.381
3650.000	.0006	68.3	64.009
3700.000	.0005	-142.2	65.613
3750.000	.0004	8.5	67.881
3800.000	.0003	161.9	69.328
3850.000	.0003	-51.4	69.574
3900.000	.0003	90.1	70.755
3950.000	.0002	-93.6	72.612
3999.999	.0002	53.2	73.499

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 5 TO 7

Measurement Date: 12:31 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0039	-23.5	48.108
2050.000	.0046	115.8	46.804
2100.000	.0047	-105.7	46.528
2150.000	.0050	31.4	45.936
2200.000	.0053	171.6	45.518
2250.000	.0059	-49.3	44.612
2300.000	.0063	91.4	44.029
2350.000	.0067	-137.5	43.533
2400.000	.0069	7.2	43.226
2450.000	.0072	138.2	42.896
2500.000	.0077	-79.8	42.256
2550.000	.0077	54.0	42.282
2600.000	.0081	-174.0	41.830
2650.000	.0080	-34.8	41.977
2700.000	.0078	101.8	42.112
2750.000	.0079	-125.4	42.089
2800.000	.0073	14.4	42.683
2850.000	.0072	147.9	42.839
2900.000	.0065	-83.1	43.720
2950.000	.0062	57.4	44.118
3000.000	.0057	-168.1	44.943
3050.000	.0052	-29.8	45.689
3100.000	.0047	106.4	46.601
3150.000	.0041	-118.6	47.672
3200.000	.0037	28.0	48.671
3250.000	.0032	163.1	49.860
3300.000	.0028	-56.6	51.128
3350.000	.0024	83.1	52.321
3400.000	.0021	-139.5	53.625
3450.000	.0017	-.1	55.201
3500.000	.0015	138.1	56.712
3550.000	.0013	-82.4	57.938
3600.000	.0010	69.2	59.861
3650.000	.0009	-147.9	60.845
3700.000	.0007	0.0	63.063
3750.000	.0006	149.2	64.871
3800.000	.0006	-70.0	65.191
3850.000	.0005	76.9	65.680
3900.000	.0004	-130.4	68.186
3950.000	.0004	12.4	67.815
3999.999	.0003	170.7	70.114

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SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 6 TO 7

Measurement Date: 12:32 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0043	-27.1	47.281
2050.000	.0048	112.3	46.393
2100.000	.0049	-109.6	46.257
2150.000	.0056	29.7	45.059
2200.000	.0059	167.5	44.513
2250.000	.0065	-57.1	43.746
2300.000	.0066	83.3	43.631
2350.000	.0067	-144.8	43.430
2400.000	.0071	.9	42.924
2450.000	.0075	131.9	42.538
2500.000	.0079	-87.5	42.085
2550.000	.0078	46.2	42.197
2600.000	.0082	179.4	41.746
2650.000	.0079	-40.9	42.004
2700.000	.0079	95.5	42.003
2750.000	.0078	-131.2	42.114
2800.000	.0073	7.4	42.677
2850.000	.0072	142.6	42.819
2900.000	.0065	-88.3	43.768
2950.000	.0063	51.5	43.992
3000.000	.0057	-173.1	44.808
3050.000	.0053	-35.8	45.535
3100.000	.0048	101.4	46.398
3150.000	.0042	-124.1	47.563
3200.000	.0038	21.8	48.397
3250.000	.0033	157.3	49.754
3300.000	.0028	-63.8	50.961
3350.000	.0025	76.9	51.964
3400.000	.0022	-146.5	53.341
3450.000	.0018	-7.9	54.977
3500.000	.0015	130.7	56.669
3550.000	.0012	-89.3	58.132
3600.000	.0011	59.5	59.408
3650.000	.0008	-158.1	61.442
3700.000	.0007	-10.9	63.230
3750.000	.0006	139.5	64.685
3800.000	.0005	-78.5	65.477
3850.000	.0004	64.9	66.996
3900.000	.0004	-143.8	69.096
3950.000	.0004	8.2	68.025
3999.999	.0003	163.9	70.861

E. Improvements in Data Acquisition Speed

An 8542C Automatic Network Analyzer is used to measure transmission loss between two antenna in a water loaded microwave scanner. Because of the number of measurements required, the time to collect data for a single experiment was approximately four hours. The objective of our investigation was to reduce the data collection time as much as possible without redesigning or replacing the existing hardware.

The software that controls the movement of the scanner was the first candidate for improvement. The software already provided for acceleration up to maximum speed. It computed the point to start the deceleration ramp and provided for deceleration such that there was very little chance of overshooting the desired position. Hence, the only change to be made here was to relax the positional accuracy for each axis of motion. The digital readout for this system has a resolution of 1 micron. The software was written to position each axis to within ± 1 micron of the requested location. In the vicinity of the final position, the motor is operated in the single step mode which is it's slow speed mode. Consequently, if one micron of overshoot occurs the direction of travel will be reversed . Reversal of direction requires that the backlash in the gears and lead screw be taken up before translation can occur on that axis. During this time, the motor is operating at its slowest speed since the position must be read after each step. To eliminate much of this slow speed operation, we reduce the azimuth accuracy to ± 10 microns. This resulted in approximately a five percent increase in data acquisition speed for step sizes of 2 millimeters or less with proportionally less improvement as the step size increased.

Next, the time required for the network analyzer to make a measurement was determined. For step sizes of two millimeters or less, fifty percent of the acquisition time was associated with the network analyzer measurement. The program which controls the 8542 during the measurement is named CORS4. Analysis of program CORS4 yielded the following results.

- At each frequency, this program switched an electro-mechanical relay in the input test unit. A time delay in the software was necessary to allow for the switching time. Recruiting the software to eliminate the need for switching the relay will increase program speed.

- When the frequency is initially set, the program assumes that a band change is required. With each band change, the software provides a settling time delay.

- The CORS4 program measures both transmission (S21) and refelction (S11). For this application, only the transmission measurement was required so elimination of the reflection measurement would speed up the data acquisition process.

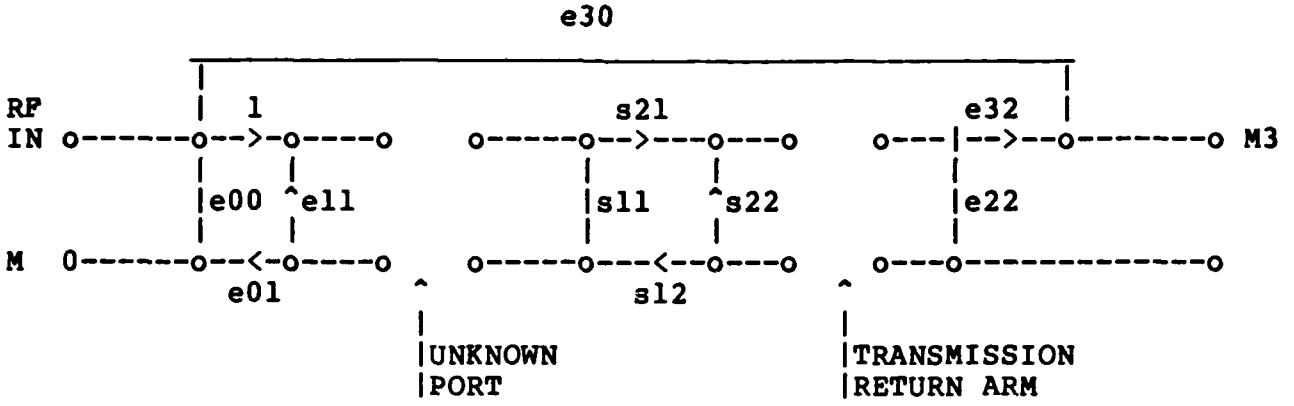
- CORS4 made the measurements as x and y components and then converted to amplitude and phase. However, it was necessary to convert back to x and y component to make further corrections.

- CORS4 returned the results with the calibration correction done. If the measurement was to be made at a frequency not in the calibration list, we could not tell if the calibration data was close enough to give a usuable result.

After reviewing the CORS4 software and the mathematical model for the error correction algorithm, we came to the conculsion that we could use the same subroutine and approximations as CORS4 used, but CORS4 itself needed to be rewritten as two routines and simplified.

One of these routines makes a measurement of the transmission and reflection coefficient at a specified frequency. This routine makes corrections for DC offset and attenuation scaling but the calibrations are left for the other routine. This subroutine is able to speed up the measurement by a factor of two by eliminating a pause between the transmission and reflection measurement which is not necessary since each call to this subroutine only measures at one frequency.

The second subroutine makes calibration corrections to these measurement using a specified set of calibration data. We assumed the model shown on page 3-41 of the 8540 SERIES SOFTWARE PROGRAMMER'S MANUAL is valid. Using the mathematical model, the effect of modifying the measurement algorithm can be predicted.



The measured reflection is:

$$M0 = e00+(e01*s11+e22*Q)/d$$

The measured gain is:

$$M3 = e30+(e32*s21)/d$$

where:

$$Q = s21*s12-s11*s22$$
$$d = 1-e11*s11-e22*s22-e11*s22*Q$$

These evaluations were solved for the parameters S11 and S21. Using the assuptions defined in the manual, the equations were further simplified.

Subtract leakage and define new terms:

$$T11 = M0-e00$$
$$T21 = M3-e30$$

Divied by tracking gives:

$$T11/e01 = (M0-e00)/e01$$
$$T21/e32 = (M3-e30)/e32$$

Correcting for mismatch gives:

$$S11 = (T11/e01)/(1+e11*T11/e01)$$
$$S21 = (T21/e01)/(1+e11*T11/e01)$$

We overcame each of the 5 above mentioned objections with the following results.

1. The time to get a corrected measurement was shortened by more than fifty percent.

2. The new routines take data at whatever frequency desired.

3. The time could be shortened by another 0.5 seconds by not measuring the reflected wave when only S21 is needed. However, due to the need for the reflection measurement to make the correction, this led to a difference of from 0.2 to 0.3 db in the corrected measurement.

   To find the value of S11 we can eliminate the transmission measurement without sacrificing any accuracy.

4. The new routines returned the data as x and y components which makes it straight forward to make further corrections.

5. Since the calibration correction is done separately, the user can vary the calibration data used to see what the change in the corrected reading is. Thus he can tell if he needs more calibration data.

We checked the results of the original CORS4 program measurements against the new routine and found no measureable difference.

SECTION III

DATA COLLECTION SOFTWARE

```
&WR7   T=00004 IS ON CR00010 USING 00036 BLKS R=0228

0001   FTN4,L
0002   C      ****************************************************************
0003   C      *                                                              *
0004   C      *            PROGRAM:  WR7                                     *
0005   C      *                                                              *
0006   C      *            ++++++++++++++++++++++++++++++++++++++            *
0007   C      *      FOR:  Walter Reed Army Institute of Research            *
0008   C      *            Department of Microwave Research                  *
0009   C      *            Walter Reed Army Medical Center                   *
0010   C      *            Washington, DC 20112                              *
0011   C      *                                                              *
0012   C      *            ++++++++++++++++++++++++++++++++++++++            *
0013   C      *                                                              *
0014   C      *       BY:  Technology USA, Inc.                              *
0015   C      *            P.O. Box 55333                                    *
0016   C      *            Fort Washington, Maryland 20744                   *
0017   C      *            Phone: (301) 292-2592                             *
0018   C      *                                                              *
0019   C      *  ------------------------------------------------------      *
0020   C      *     Program WR7 is a user interactive program for control    *
0021   C      *  of four stepper motors, in which elevation, zenith,         *
0022   C      *  rotation and azimuth movements are executed to position     *
0023   C      *  the R.F. antenna.  Coordinates of each of these four        *
0024   C      *  possible directions are always displayed and new            *
0025   C      *  coordinates are entered for position change.                *
0026   C      *                                                              *
0027   C      ****************************************************************
0028          PROGRAM WR7
0029   C        this line contains unprinted escape Y to turn on display functons $
$&13V 0030          INTEGER CRT,OPTION,PRGNM,PRGNL$
$&13V 0031          REAL    INCRE(4)$
$&13V 0032          DIMENSION IBUF(10,2),PRESNT(4),PNEW(4),IER(4),DIRECT(4),PRGNM(3)$
$&13V 0033          CRT=1 $
$&13V 0034          LUZE=29 $
$&13V 0035          LUAZ=31 $
$&13V 0036          LUEL=35 $
$&13V 0037          LURO=33 $
$&13V 0038          MESS=0$
$&13V 0039          I1=15446B $
$&13V 0040          INCRE(1)=75.0 $
$&13V 0041          INCRE(2)=2.0$
$&13V 0042          INCRE(3)=20.0 $
$&13V 0043          INCRE(4)=20.0 $
$&13V 0044          IBUF(1,1) = 2HAZ$
$&13V 0045          IBUF(2,1) = 2HZE$
$&13V 0046          IBUF(3,1) = 2HEL$
$&13V 0047          IBUF(4,1) = 2HRO$
$&13V 0048          IBUF(1,2) = 2H 7$
$&13V 0049          IBUF(2,2) = 2H 9$
$&13V 0050          IBUF(3,2) = 2H11$
$&13V 0051          IBUF(4,2) = 2H13$
$&13V 0052          PRGNM(1) = 1HW$
$&13V 0053          PRGNM(2) = 1HR$
$&13V 0054          PRGNM(3) = 1H7$
$&13V 0055          PRGNL = 3 $
$&13V 0056          DO 50 I=1,4 $
$&13V 0057          PNEW(I)=9E13$
$&13V 0058       50 PRESNT(I)=9E13$
$&13V 0059     C-------------------------------------------------------------
$&13V 0060     C  Determine the position of each scanner axis. $
$&13V 0061     C-------------------------------------------------------------
$&13V 0062          CALL WR1(CRT,LUAZ,PRESNT(1),IERR,MESS)$
```

```
                  CALL WR1(CRT,LUZE,PRESNT(1),IERR,MESS)
&13V 0063         IF(IERR.EQ.0) GOTO 65 
&13V 0064           CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)
&13V 0065         GOTO 9000 
&13V 0066      65 CALL WR1(CRT,LUZE,PRESNT(2),IERR,MESS)
&13V 0067         IF(IERR.EQ.0) GOTO 70 
&13V 0068           CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)
&13V 0069         GOTO 9000 
&13V 0070      70 CALL WR1(CRT,LUEL,PRESNT(3),IERR,MESS)
&13V 0071         IF(IERR.EQ.0) GOTO 80 
&13V 0072           CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)
&13V 0073         GOTO 9000 
&13V 0074   80    CALL WR3(CRT,LURO,PRESNT(4),IERR,MESS)
&13V 0075         IF(IERR.EQ.0) GOTO 90 
&13V 0076           CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)
&13V 0077   C     GO TO 9000
&13V 0078   C-------------------------------------------------------------------
&13V 0079   C  Display headings on CRT. 
&13V 0080   C-------------------------------------------------------------------
&13V 0081      90 IHOME=15510B
&13V 0082         ICLEAR=15512B 
&13V 0083         WRITE(CRT,100) IHOME,ICLEAR 
&13V 0084     100 FORMAT(2A2) 
&13V 0085         WRITE(CRT,105)
&13V 0086     105 FORMAT(21X,"WALTER REED ARMY INSTITUTE OF RESEARCH",/,
&13V 0087        *26X,"SCANNER POSITIONING PROGRAM",/,
&13V 0088        */,
&13V 0089        *1X,"AXIS",16X,"PRESENT POSITION",16X,"NEW POSITION",/,
&13V 0090        *1X,"----",16X,"----------------",16X,"------------",/)
&13V 0091         WRITE(CRT,120)
&13V 0092     120 FORMAT("&dBAZ&d@imuth",/,/, 
&13V 0093        *"&dBZE&d@nith",/,/, 
&13V 0094        *"&dBEL&d@evation",/,
&13V 0095        */,
&13V 0096        *"&dBRO&d@tation",/,/,/, 
&13V 0097        */,
&13V 0098        *"&dBGO&d@",/, 
&13V 0099        *"&dBDE&d@mo",/, 
&13V 0100        *"&dBST&d@op",/, 
&13V 0101        */,
&13V 0102        *"Enter your selection.  _") 
&13V 0103         CALL UPDAT(PRESNT,IBUF,IER) 
&13V 0104         DO 122 I=1,4
&13V 0105     122 IER(I)=0
&13V 0106   C-------------------------------------------------------------------
&13V 0107   C  Clear selection, reposition cursor for a new one, and read it
&13V 0108   C-------------------------------------------------------------------
&13V 0109     123 WRITE(CRT,124) I1,I1
&13V 0110     124 FORMAT(1A2,"a 23c 21Y_     ",1A2,"a 23c 21Y_") 
&13V 0111     125 READ(CRT,130) OPTION
&13V 0112     130 FORMAT(1A2) 
&13V 0113         IF (OPTION .NE. 2HAZ .AND. OPTION .NE. 2HZE .AND. 
&13V 0114        *    OPTION .NE. 2HEL .AND. OPTION .NE. 2HRO) GO TO 500
&13V 0115   C-------------------------------------------------------------------
&13V 0116   C  Inquire the new position.
&13V 0117   C-------------------------------------------------------------------
&13V 0118         DO 200 I=1,4
&13V 0119         IF (OPTION .NE. IBUF(I,1)) GO TO 200
&13V 0120         WRITE(CRT,170) I1,IBUF(I,2) 
&13V 0121     170 FORMAT(1A2,"a 53c ",1A2,"Y_") 
&13V 0122         READ(CRT,*) PNEW(I) 
&13V 0123         GO TO 250 
&13V 0124     200 CONTINUE
&13V 0125     250 GO TO 123 
&13V 0126   C-------------------------------------------------------------------
&13V 0127   C  If GO is selected, then move.
&13V 0128   C-------------------------------------------------------------------
```

```
§&13V 0129     500 IF (OPTION .NE. 2HGO) GO TO 1000§
§&13V 0130         IF(PNEW(1).EQ.9E13) GOTO 600§
§&13V 0131         CALL WR6(PNEW(1),IER(1),2,0)§
§&13V 0132         IF ((IER(1) .EQ. 0) .OR.§
§&13V 0133        *   ((IER(1) .EQ. 210B) .OR. (IER(1) .EQ. 220B))) GO TO 510§
§&13V 0134           CALL WR12(CRT,IER(1),.TRUE.,IERR,IERR,PRGNM,PRGNL)§
§&13V 0135           GO TO 9000§
§&13V 0136   510   CALL WR1(CRT,LUAZ,PRESNT(1),IERR,.TRUE.)§
§&13V 0137     600 IF(PNEW(2).EQ.9E13) GOTO 620§
§&13V 0138         CALL WR6(PNEW(2),IER(2),1,0)§
§&13V 0139         IF ((IER(2) .EQ. 0) .OR.§
§&13V 0140        *   ((IER(2) .EQ. 110B) .OR. (IER(2) .EQ. 120B))) GO TO 610§
§&13V 0141           CALL WR12(CRT,IER(2),.TRUE.,IERR,IERR,PRGNM,PRGNL)§
§&13V 0142           GO TO 9000§
§&13V 0143   610   CALL WR1(CRT,LUZE,PRESNT(2),IERR,.TRUE.)§
§&13V 0144     620 IF(PNEW(3).EQ.9E13) GOTO 640§
§&13V 0145         CALL WR6(PNEW(3),IER(3),4,0)§
§&13V 0146         IF ((IER(3) .EQ.0) .OR. §
§&13V 0147        *   ((IER(3) .EQ. 410B) .OR. (IER(3) .EQ. 420B))) GO TO 630§
§&13V 0148           CALL WR12(CRT,IER(3),.TRUE.,IERR,IERR,PRGNM,PRGNL)§
§&13V 0149           GO TO 9000§
§&13V 0150   630   CALL WR1(CRT,LUEL,PRESNT(3),IERR,.TRUE.)§
§&13V 0151     640 IF(PNEW(4).EQ.9E13) GOTO 660§
§&13V 0152         CALL WR6(PNEW(4),IER(4),3,0)§
§&13V 0153         IF ((IER(4) .EQ.0) .OR. §
§&13V 0154        *   ((IER(4) .EQ. 310B) .OR. (IER(4) .EQ. 320B))) GO TO 650§
§&13V 0155           CALL WR12(CRT,IER(4),.TRUE.,IERR,IERR,PRGNM,PRGNL)§
§&13V 0156           GO TO 9000§
§&13V 0157   650   CALL WR3(CRT,LURO,PRESNT(4),IERR,.TRUE.)§
§&13V 0158   C-------------------------------------------------------------------§
§&13V 0159   C  Call UPDAT to display the current locations and erase the new§
§&13V 0160   C  position column. §
§&13V 0161   C-------------------------------------------------------------------§
§&13V 0162     660 CALL UPDAT(PRESNT,IBUF,IER) §
§&13V 0163         DO 670 I=1,4§
§&13V 0164         PNEW(I) = 9E13§
§&13V 0165     670 IER(I) = 0§
§&13V 0166         GO TO 123 §
§&13V 0167    1000 IF (OPTION .NE. 2HDE) GO TO 2000§
§&13V 0168   C-------------------------------------------------------------------§
§&13V 0169   C  DEMO section.§
§&13V 0170   C-------------------------------------------------------------------§
§&13V 0171         DO 1050 I=1,4 §
§&13V 0172    1050 DIRECT(I)=1.0 §
§&13V 0173         DO 1800 I=1,10§
§&13V 0174   01055 CALL WR1(1,LUAZ,PRESNT(1),IERR,.TRUE.)§
§&13V 0175         CALL WR1(1,LUZE,PRESNT(2),IERR,.TRUE.)§
§&13V 0176         CALL WR1(1,LUEL,PRESNT(3),IERR,.TRUE.)§
§&13V 0177         CALL WR3(1,LURO,PRESNT(4),IERR,.TRUE.)§
§&13V 0178         DO 1200 J=1,4 §
§&13V 0179         PNEW(J) = PRESNT(J) + INCRE(J)*DIRECT(J)§
§&13V 0180         WRITE(CRT,1100) I1,IBUF(J,2),PRESNT(J),I1,IBUF(J,2),PNEW(J) §
§&13V 0181    1100 FORMAT(1A2,"a 22c ",1A2,"Y",F12.4,1A2,"a 53c ",1A2,"Y",F12.4) §
§&13V 0182    1200 CONTINUE§
§&13V 0183   C-------------------------------------------------------------------- §
§&13V 0184   C  Move the Azimuth axis. §
§&13V 0185   C-------------------------------------------------------------------- §
§&13V 0186         CALL WR6(PNEW(1),IERR,2,0)§
§&13V 0187         IF (IERR .EQ. 0) GO TO 1300 §
§&13V 0188         IF ((IERR .NE. 210B) .AND. (IERR .NE. 220B)) GO TO 1290 §
§&13V 0189           DIRECT(1) = -(DIRECT(1))§
§&13V 0190           GO TO 1300§
§&13V 0191   1290    CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)§
§&13V 0192           GO TO 9000§
§&13V 0193   C-------------------------------------------------------------------- §
§&13V 0194   C  Move the Zenith axis.§
```

```
%&13V 0195  C-----------------------------------------------------------------
%&13V 0196   1300 CALL WR6(PNEW(2),IERR,1,1)%
%&13V 0197        IF (IERR .EQ. 0) GO TO 1400 %
%&13V 0198        IF ((IERR .NE. 110B) .AND. (IERR .NE. 120B)) GO TO 1390 %
%&13V 0199          DIRECT(2) = -(DIRECT(2))%
%&13V 0200          GO TO 1400%
%&13V 0201  1390    CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)%
%&13V 0202          GO TO 9000%
%&13V 0203  C-----------------------------------------------------------------
%&13V 0204  C  Move the Elevation axis. %
%&13V 0205  C-----------------------------------------------------------------
%&13V 0206   1400 CALL WR6(PNEW(3),IERR,4,1)%
%&13V 0207        IF (IERR .EQ. 0) GO TO 1500 %
%&13V 0208        IF ((IERR .NE. 410B) .AND. (IERR .NE. 420B)) GO TO 1490 %
%&13V 0209          DIRECT(3) = -(DIRECT(3))%
%&13V 0210          GO TO 1500%
%&13V 0211  1490    CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)%
%&13V 0212          GO TO 9000%
%&13V 0213  C-----------------------------------------------------------------
%&13V 0214  C  Move the rotation axis.%
%&13V 0215  C-----------------------------------------------------------------
%&13V 0216   1500 CALL WR6(PNEW(4),IERR,3,1)%
%&13V 0217        IF (IERR .EQ. 0) GO TO 1800 %
%&13V 0218        IF ((IERR .NE. 310B) .AND. (IERR .NE. 320B)) GO TO 1590 %
%&13V 0219          DIRECT(4) = -(DIRECT(4))%
%&13V 0220          GO TO 1800%
%&13V 0221  1590    CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)%
%&13V 0222          GO TO 9000%
%&13V 0223   1800 CONTINUE%
%&13V 0224        GO TO 123 %
%&13V 0225  C-----------------------------------------------------------------%
%&13V 0226  C  See if the user wishes to stop the program.%
%&13V 0227  C-----------------------------------------------------------------%
%&13V 0228   2000 IF (OPTION .EQ. 2HST) GO TO 9000%
%&13V 0229        GO TO 123 %
%&13V 0230  C-----------------------------------------------------------------%
%&13V 0231  C  Terminate the program. %
%&13V 0232  C-----------------------------------------------------------------%
%&13V 0233   9000 END %
%&13V 0234  C-----------------------------------------------------------------%
%&13V 0235  C-----------------------------------------------------------------
%&13V 0236  C-----------------------------------------------------------------
%&13V 0237  C  Subroutine UPDAT will display the current locations and erase new%
%&13V 0238  C  position columns.%
%&13V 0239  C-----------------------------------------------------------------
%&13V 0240        SUBROUTINE UPDAT(PRESNT,IBUF,IER) %
%&13V 0241        DIMENSION PRESNT(4),IER(4),IBUF(10,2) %
%&13V 0242        I1=15446B %
%&13V 0243        DO 100 I=1,4%
%&13V 0244        WRITE(1,20) I1,IBUF(I,2),PRESNT(I)%
%&13V 0245     20 FORMAT(1A2,"a 22c ",1A2,"Y",F12.3,30(" "))%
%&13V 0246        IF ((IER(I) .NE. 110B) .AND. (IER(I) .NE. 120B) .AND. %
%&13V 0247       *    (IER(I) .NE. 210B) .AND. (IER(I) .NE. 220B) .AND. %
%&13V 0248       *    (IER(I) .NE. 310B) .AND. (IER(I) .NE. 320B) .AND. %
%&13V 0249       *    (IER(I) .NE. 410B) .AND. (IER(I) .NE. 420B)) GO TO 50 %
%&13V 0250          WRITE(1,30) I1%
%&13V 0251     30 FORMAT(1A2,"a 22C Limit Exceeded")%
%&13V 0252        GO TO 100 %
%&13V 0253     50 WRITE(1,60) I1%
%&13V 0254     60 FORMAT(1A2,"a 22C",30(" ")) %
%&13V 0255    100 CONTINUE%
%&13V 0256        RETURN%
%&13V 0257  C %Z
```

```
0258          END
0259          END$
```

```
&WR8M  T=00004 IS ON CR00010 USING 00010 BLKS R=0053

0001   FTN4,L
0002   C 24998-18466 REV.2040 (810304.1057)
0003   C*************************************************************************
0004   C
0005   C                          PROGRAM WR8
0006   C
0007   C  DESCRIPTION:
0008   C   WR8 is designed to obtain microwave transmission data at different
0009   C   points along a scan of any object and then to make a graph of
0010   C   attenuation versus position of these data.
0011   C   This program has been divided into three segments because it
0012   C   cannot fit into memory otherwise.  The main segment always remains
0013   C   in memory.  The other two segments overlay each other by one
0014   C   segment calling EXEC(8, other segment name) to read in the
0015   C   other segment over the calling segment and then pass control
0016   C   to it.  It can return to the calling segment only by calling
0017   C   EXEC(8, other segment name) again.
0018   C   This segment is the main segment.  It is run by typing in:
0019   C                    RU,WR8
0020   C   This segment only defines common, initializes variables, and
0021   C   then calls EXEC(8,WR8C) to read in and pass control to segment
0022   C   WR8C.
0023   C
0024   C*************************************************************************
0025   C
0026         PROGRAM WR8
0027   C
0028         DIMENSION DAT(1002,2),IPRNM(3),INAME(3)
0029         INTEGER CRT
0030         COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESNT,
0031        *       OFFSET,STEPSZ,RFREQ,IEND,TEMP1,TEMP2,IRNUM
0032         IRNUM = 1
0033         CRT = 1
0034         IPRNM(1) = 1HW
0035         IPRNM(2) = 1HR
0036         IPRNM(3) = 1H8
0037         IPRNL = 3
0038         MESS = -1
0039         OFFSET = 10
0040         STEPSZ = 10
0041         IEND   =  3
0042   C-----------------------------------------------------------------
0043   C  Call EXEC to read in segment WR8C and pass control to it.
0044   C-----------------------------------------------------------------
0045   C
0046         ICODE=8
0047         INAME(1)=2HWR
0048         INAME(2)=2H8C
0049         INAME(3)=2H
0050         CALL EXEC (ICODE, INAME)
0051         END
0052         END$
```

```
&WR8C  T=00004 IS ON CR00010 USING 00038 BLKS R=0199

0001  FTN4,L
0002  C      ****************************************************************
0003  C      *                                                              *
0004  C      *            SEGMENT:  WR8C                                    *
0005  C      *                                                              *
0006  C      *            ++++++++++++++++++++++++++++++++++++              *
0007  C      *      FOR:  Walter Reed Army Institute of Research            *
0008  C      *            Department of Microwave Research                  *
0009  C      *            Walter Reed Army Medical Center                   *
0010  C      *            Washington, DC 20112                              *
0011  C      *                                                              *
0012  C      *            ++++++++++++++++++++++++++++++++++++              *
0013  C      *                                                              *
0014  C      *       BY:  Technology USA, Inc.                              *
0015  C      *            P.O. Box 55333                                    *
0016  C      *            Fort Washington, Maryland 20744                   *
0017  C      *            Phone: (301) 292-2592                             *
0018  C      *                                                              *
0019  C      *  ------------------------------------------------------------*
0020  C      *     Segment WR8C is the control segment of WR8.  It puts     *
0021  C      *  out a menu with the options:                                *
0022  C      *    1 - Enter the offset and step size.                       *
0023  C      *    2 - Enter the microwave frequency.                        *
0024  C      *    3 - Set antennae to a new position.                       *
0025  C      *    4 - Enter number of readings to average for each point.   *
0026  C      *    5 - Scan from present position                            *
0027  C      *    9 - Terminate the program.                                *
0028  C      *  After 5 is chosen, the antennae are psitioned at the        *
0029  C      *  present position-offset and advanced by stepsize until      *
0030  C      *  the the antennae reach present position+offset.  At each    *
0031  C      *  position, amplitude is averaged over the number of          *
0032  C      *  readings specified in 4 and saved in the array DAT along    *
0033  C      *  with the position.  At the end of the scan, this segment    *
0034  C      *  calls EXEC to read in segment WR8G and pass control to it.  *
0035  C      *                                                              *
0036  C      ****************************************************************
0037        PROGRAM WR8C,5
0038        DIMENSION DAT(1002,2),IPRNM(3),INAME(3)
0039        INTEGER CRT
0040        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESNT,
0041       *       OFFSET,STEPSZ,RFREQ,IEND,TEMP1,TEMP2,IRNUM
0042  C
0043        COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,NONLY,
0044       *CM(4,112),IHEAD(40),IDATE(15)
0045        CALL FILE2(1)
0046        TEMP1 = D(1)
0047        TEMP2 = (D(3)-1) * D(2) + D(1)
0048        LUAZ = 31
0049  C-------------------------------------------------------------------------
0050  C  Clear screen and print heading.
0051  C-------------------------------------------------------------------------
0052        WRITE(CRT,15)
0053   015  FORMAT("",
0054       *       10X,55'*',/,
0055       *10X,"*",20X,"PROGRAM  WR8",21X,"*",/,
0056       *10X,"*",16X,"S21 LINE SCAN PROGRAM",16X,"*",/,
0057       *10X,55'*',/,'')
0058  C
```

```
0059   530  CALL WR1 (CRT,LUAZ,PRESNT,IERR,0)
0060        IF (IERR .EQ. 0) GO TO 535
0061          CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0062          GO TO 9090
0063   535  WRITE(CRT,540) PRESNT
0064   540  FORMAT (/,1X,"PRESENT POSITION =",F9.3,"mm")
0065   550  WRITE(CRT,600)
0066   600  FORMAT(/," PLEASE SELECT AN OPTION:",/,
0067       *"    1 - Enter the offset and step size.",/,
0068       *"    2 - Enter the microwave frequency.",/,
0069       *"    3 - Set antennae to a new position.",/,
0070       *"    4 - Enter number of readings to average for each point.",/,
0071       *"    5 - Scan from the present postion.",/,
0072       *"    9 - Terminate the program.",/,/,
0073       *" ENTER SELECTION  _")
0074        READ(CRT,*) IANS
0075        IF (IANS .EQ. 9999) GO TO 9090
0076        IF (IANS .EQ. 9) GO TO 9090
0077        IF (IANS .EQ. 5) GO TO 5000
0078        IF (IANS .EQ. 4) GO TO 4000
0079        IF (IANS .EQ. 3) GO TO 3000
0080        IF (IANS .EQ. 2) GO TO 2000
0081        IF (IANS .EQ. 1) GO TO 1000
0082        WRITE (CRT,620)
0083    620 FORMAT (/,1X,"ERROR # WR8 - 10201 ......(WR8)",/,
0084       *        1X,"INCORRECT RESPONSE.  ENTER 1, 2, 3, 4, 5, OR 9.")
0085        GO TO 550
0086  C-------------------------------------------------------------------
0087  C  Inquire from the user:  step size and starting offset.
0088  C-------------------------------------------------------------------
0089  1000  WRITE(CRT,1100)
0090  1100  FORMAT(/," Enter the starting offset (mm).  _")
0091        READ(CRT,*) OFFSET
0092        IF (OFFSET .EQ. 9999) GO TO 9090
0093        IF (OFFSET .LT. 105) GO TO 1190
0094          WRITE (CRT,1109)
0095   1109   FORMAT (/,1X,"ERROR # WR8 - 10202 ......(WR8)",/,
0096       *          1X,"THE OFFSET MUST BE LESS THAN 105mm.",/,
0097       *          1X,"REENTER THE STARTING OFFSET.")
0098          GO TO 1000
0099  1190  WRITE(CRT,1200)
0100  1200  FORMAT(/," Enter the step size (mm).......  _")
0101        READ(CRT,*) STEPSZ
0102        IF (STEPSZ .EQ. 9999) GO TO 9090
0103        IEND = (OFFSET*2.0)/STEPSZ + 1.5
0104        IF (IEND .LT. 1001) GO TO 530
0105        WRITE (CRT,1209)
0106   1209   FORMAT (/,1X,"ERROR # WR8 - 10203 ......(WR8)",/,1X,
0107       *          "THE NUMBER OF DATA POINTS MUST NOT EXCEED 1000.",/,
0108       *          1X,"REENTER THE STARTING OFFSET AND STEP SIZE.")
0109        GO TO 1000
0110  C-------------------------------------------------------------------
0111  C  Inquire the microwave frequency.
0112  C-------------------------------------------------------------------
0113  2000  WRITE(CRT,2500)
0114  2500  FORMAT(/," Enter the RF frequency (MHz)...  _")
0115        READ(CRT,*)  RFREQ
0116        IF (RFREQ .EQ. 9999) GO TO 9090
0117        IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 530
0118          WRITE (CRT,2509) TEMP1, TEMP2
```

```
0119  2509    FORMAT (/,1X,"ERROR # WR8 - 10204 ......(WR8)",/,1X,
0120       *          "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0121       *          /,1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0122       *          /,1X,"Do you wish to recalibrate?  (YES/NO) _")
0123          READ (CRT,2599) IANS
0124  2599    FORMAT (A2)
0125          IF (IANS .EQ. 2HYE) GO TO 9000
0126          GO TO 2000
0127  C-----------------------------------------------------------------------
0128  C  Inquire new position and call WR6 to set it.
0129  C-----------------------------------------------------------------------
0130  3000  WRITE (CRT,3090)
0131  3090  FORMAT (/,1X,"Enter new position (mm).  _")
0132        READ (CRT,*) PRESNT
0133        IF (PRESNT .EQ. 9999) GO TO 9090
0134        CALL WR6 (PRESNT,IERR,2,0)
0135        IF (IERR .EQ. 0) GO TO 530
0136          CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0137          GO TO 9090
0138  C-----------------------------------------------------------------------
0139  C  Inquire from the user: number of readings per data point.
0140  C-----------------------------------------------------------------------
0141  4000  WRITE (CRT,4009)
0142  4009  FORMAT (/,1X,
0143       *        "Enter number of readings to average per data point. _")
0144        READ (CRT,*) IRNUM
0145        IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0))  GO TO 530
0146        WRITE (CRT,4509)
0147  4509  FORMAT (/,1X,"ERROR # WR8 - 10205 ......(WR8)",/,
0148       *         1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0149       *         1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0150        GO TO 4000
0151  C-----------------------------------------------------------------------
0152  C  Scan from PRESNT-OFFSET to PRESNT+OFFSET, put S21 in DAT(I,2).
0153  C-----------------------------------------------------------------------
0154   5000 IF (RFREQ .NE. 0) GO TO 5100
0155        RFREQ = D(1)
0156   5100 POSITN = PRESNT-OFFSET
0157        CALL CALF2(3, MC, RFREQ)
0158        DAT(1,1) = PRESNT - OFFSET
0159        DAT(1,2) = PRESNT + OFFSET
0160        DAT(2,1) = STEPSZ
0161        DAT(2,2) = RFREQ
0162        DO 5800 I=3,IEND+2
0163        IF (IFBRK(IERR)) 9090,5200
0164   5200 PARAM = POSITN
0165        CALL WR6(PARAM,IERR,2,0)
0166        IF (IERR .EQ.0) GO TO 5700
0167          CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0168          GO TO 9090
0169  C     CALL CALF2(2,1,F)
0170   5700 XAVE = 0.
0171        YAVE = 0.
0172        DO 5750 J=1,IRNUM
0173        CALL MESUR(RFREQ, X1, Y1, X, Y)
0174        CALL CORCT(MC, X1, Y1, X, Y)
0175        XAVE = XAVE + X
0176   5750 YAVE = YAVE + Y
0177        XAVE = XAVE / IRNUM
0178        YAVE = YAVE / IRNUM

0179        RLOSS =-10*ALOGT(XAVE*XAVE + YAVE*YAVE)
```

```
0180         WRITE (CRT,5799) POSITN,RLOSS
0181   5799  FORMAT (1X,"AZIMUTH = ",F8.3," RLOSS = ",F9.4)
0182         DAT(I,2) = RLOSS
0183         DAT(I,1) = POSITN
0184         POSITN = POSITN + STEPSZ
0185    5800 CONTINUE
0186         CALL WR6 (PRESNT,IERR,2,0)
0187   C-------------------------------------------------------------------
0188   C  Call EXEC to overlay this segment with WR8G
0189   C-------------------------------------------------------------------
0190         INAME(2) = 2H8G
0191         CALL EXEC (ICODE,INAME)
0192    9000 WRITE (CRT,9009)
0193    9009 FORMAT (2/,1X,"Run program AGS02 for new calibration.")
0194    9090 WRITE (CRT,9099)
0195    9099 FORMAT (3/,10X,
0196        *"**********  PROGRAM WR8 TERMINATED  **********")
0197         END
0198   C
0199   C  Block data routine for AGS2C
0200   C
0201         BLOCK DATA AGS2C
0202         COMMON /AGS2C/ I(2330)
0203         END
0204         END$
```

```
$WR8G  T=00004 IS ON CR32767 USING 00088 BLKS R=0661

0001  FTN4,L
0002  C      ***************************************************************
0003  C      *                                                             *
0004  C      *           SEGMENT:  WR8G                                    *
0005  C      *                                                             *
0006  C      *           ++++++++++++++++++++++++++++++++++++++            *
0007  C      *      FOR: Walter Reed Army Institute of Research            *
0008  C      *           Department of Microwave Research                  *
0009  C      *           Walter Reed Army Medical Center                   *
0010  C      *           Washington, DC 20112                              *
0011  C      *                                                             *
0012  C      *           ++++++++++++++++++++++++++++++++++++++            *
0013  C      *                                                             *
0014  C      *       BY: Technology USA, Inc.                              *
0015  C      *           P.O. Box 55333                                    *
0016  C      *           Fort Washington, Maryland 20744                   *
0017  C      *           Phone: (301) 292-2592                             *
0018  C      *                                                             *
0019  C      *  -------------------------------------------------------    *
0020  C      *     Segment WR8G is the graphing segment of WR8.  It is     *
0021  C      *  read in and control passed to it by an EXEC(8,WR8G) call   *
0022  C      *  from segment WR8C after a scan is finished.  WR8G then     *
0023  C      *  displays a graph of the attenuation versus position        *
0024  C      *  on the CRT.  This graph is displayed until the user        *
0025  C      *  presses the return key at which point WR8G calls EXEC      *
0026  C      *  (8,WR8C) to read in WR8C and pass control to it, unless    *
0027  C      *  the user enters '9999' first in which case WR8G            *
0028  C      *  terminates the program.                                    *
0029  C      *                                                             *
0030  C      ***************************************************************
0031        PROGRAM WR8G,5
0032  C
0033        DIMENSION DAT(1002,2),IPRNM(3),INAME(3)
0034        INTEGER STATUS, ALPHLU,  GOUTLU, CRT
0035        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESNT,
0036       *       OFFSET,STEPSZ,RFREQ,IEND,TEMP1,TEMP2,IRNUM
0037        DATA ALPHLU, GOUTLU /1,1/
0038  C
0039  C  STATUS  -  Set to zero if no errors occur in a called routine
0040  C  ALPHLU  -  The LU of the alphanumeric device
0041  C  GOUTLU  -  The LU of the graphics output device
0042  C
0043  C*******************************************************************************
0044  C
0045        XMIN = DAT(1,1)
0046        XMAX = DAT(1,2)
0047        YMIN = DAT(3,2)
0048        YMAX = DAT(3,2)
0049        DO 5100 I=4,IEND+2
0050        IF (DAT(I,2) .GT. YMAX) YMAX = DAT(I,2)
0051        IF (DAT(I,2) .LT. YMIN) YMIN = DAT(I,2)
0052   5100 CONTINUE
0053   5110 CONTINUE
0054  C-------------------------------------------------------------------
0055  C  Initialize DGL system
0056  C-------------------------------------------------------------------
0057        WRITE(CRT,5200)
0058   5200 FORMAT("")
```

```
0059          CALL ZBEGN
0060    C-------------------------------------------------------------------
0061    C  Enable all devices, exit if any errors
0062    C-------------------------------------------------------------------
0063          CALL ENDEV (ALPHLU,GOUTLU,STATUS)
0064          IF (STATUS .NE. 0) GOTO 9990
0065    C-------------------------------------------------------------------
0066    C  Perform the viewing transformation, exit if any errors
0067    C-------------------------------------------------------------------
0068          IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0069          YMIN = INT (YMIN)
0070          GO TO 5400
0071     5300 YMIN = INT (YMIN - .999)
0072     5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0073          YMAX = INT (YMAX + .999)
0074          GO TO 5600
0075     5500 YMAX = INT (YMAX)
0076     5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0077          CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0078          IF (STATUS .NE. 0) GOTO 9990
0079    C-------------------------------------------------------------------
0080    C  Draw axis and label, then plot.
0081    C-------------------------------------------------------------------
0082          CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IEND)
0083    C-------------------------------------------------------------------
0084    C  Disable logical devices
0085    C-------------------------------------------------------------------
0086          READ (CRT,*) IANS
0087          IF (IANS .EQ. 9999) GO TO 9990
0088          CALL ZNEWF
0089          CALL CLEAR
0090    C-------------------------------------------------------------------
0091    C  Call EXEC to overlay this segment with WR8C and execute it.
0092    C-------------------------------------------------------------------
0093          INAME(2) = 2H8C
0094          CALL EXEC (ICODE, INAME)
0095     9990 CONTINUE
0096    C
0097          CALL ZAEND
0098          CALL ZDEND
0099    C-------------------------------------------------------------------
0100    C  Disable DGL system
0101    C-------------------------------------------------------------------
0102          CALL ZEND
0103    C-------------------------------------------------------------------
0104    C  Terminate program
0105    C-------------------------------------------------------------------
0106     9998 WRITE(CRT,9999)
0107     9999 FORMAT("")
0108          END
0109    C
0110    C*******************************************************************************
0111    C                          ENDEV SUBROUTINE
0112    C
0113    C  PURPOSE:       This subroutine enables all logical devices used by
0114    C                 the program.
0115    C
0116    C  DESCRIPTION:   This subroutine enables the DGL work station.  The DGL
0117    C                 workstation contains alphanumeric and graphics output
0118    C                 devices.
```

```
0119  C
0120  C  CALLING SEQUENCE:  CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0121  C
0122  C  PARAMETERS:
0123  C                  ALPHLU:  [INTEGER]; Alphanumeric LU
0124  C                  GOUTLU:  [INTEGER]; Graphics output LU
0125  C                  STATUS:  [INTEGER]; Set to zero if no errors occur
0126  C                                      during initialization of the
0127  C                                      workstation.  It is set to the
0128  C                                      DGL error return value if an
0129  C                                      error is found.
0130  C
0131  C*************************************************************************
0132  C
0133        SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0134  C
0135        INTEGER ALPHLU, GOUTLU,  STATUS
0136        INTEGER CONTRL
0137  C-------------------------------------------------------------------------
0138  C  If an error occurs, write out an error message, and return.
0139  C
0140  C  Enable alphanumeric device
0141  C-------------------------------------------------------------------------
0142        CALL ZAINT (ALPHLU,STATUS)
0143        IF (STATUS .EQ. 0) GOTO 1000
0144          CALL ERRMS (ALPHLU,STATUS,6HZAINT )
0145   1000 CONTINUE
0146  C-------------------------------------------------------------------------
0147  C  Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0148  C-------------------------------------------------------------------------
0149        CONTRL = 0
0150        CALL ZDINT (GOUTLU,CONTRL,STATUS)
0151          IF (STATUS .EQ. 0) GOTO 9999
0152          CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0153   9999 CONTINUE
0154  C-------------------------------------------------------------------------
0155  C Return to main program after all devices are properly enabled
0156  C-------------------------------------------------------------------------
0157        RETURN
0158        END
0159  C
0160  C*************************************************************************
0161  C
0162  C                          SUBROUTINE VIEWT
0163  C
0164  C  PURPOSE:          This subroutine performs the initial viewing
0165  C                    transformation.
0166  C
0167  C  DESCRIPTION:      This subroutine performs the viewing transformation in
0168  C                    the following steps:
0169  C
0170  C                     - Places the image on the largest possible area
0171  C                     - Sets the window to the desired range.
0172  C                     - Resets the viewport to leave room for labels
0173  C                     - Recomputes character size based on specified window
0174  C
0175  C  CALLING SEQUENCE:  CALL VIEWT
0176  C
0177  C  PARAMETERS:       NONE
0178  C
```

```
0179  C*************************************************************************
0180  C
0181        SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0182  C
0183        INTEGER IDUM, IERR
0184        REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0185        REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0186  C
0187  C  IDUM     -  Dummy var
0188  C  IERR     -  Error return (not used)
0189  C  AR       -  Holds aspect ratio
0190  C  VIEW     -  Holds current viewport bounds
0191  C  XSIZE    -  Temp work variable
0192  C  YSIZE    -  Temp work variable
0193  C  XCSIZ    -  Temp holder of character size X
0194  C  XCSIZ    -  Temp holder of character size Y
0195  C  WXMIN    -  Temp holder of window X - min
0196  C  WXMAX    -  Temp holder of window X - max
0197  C  WYMIN    -  Temp holder of window Y - min
0198  C  WYMAX    -  Temp holder of window Y - max
0199  C  MINX     -  Temp holder of new viewport X - min
0200  C  MAXX     -  Temp holder of new viewport X - max
0201  C  MINY     -  Temp holder of new viewport Y - min
0202  C  MAXY     -  Temp holder of new viewport Y - max
0203  C
0204  C*************************************************************************
0205  C
0206  C  Inquire aspect ratio of logical display limits
0207  C-------------------------------------------------------------------------
0208        CALL ZIWS (254,0,2,IDUM,AR,IERR)
0209        IF (IERR .EQ. 0) GO TO 555
0210          CALL ERRMS (1,IERR,6HZIWS  )
0211          GO TO 9999
0212  C-------------------------------------------------------------------------
0213  C  Make the largest possible area of the logical display available
0214  C  for graphical output by setting the aspect ratio(AR).
0215  C-------------------------------------------------------------------------
0216    555 YSIZE = AR(2)
0217        XSIZE = 1.0
0218        CALL ZASPK (XSIZE,YSIZE)
0219  C-------------------------------------------------------------------------
0220  C  Specify the desired range of X and Y values of the window
0221  C-------------------------------------------------------------------------
0222        CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0223  C-------------------------------------------------------------------------
0224  C  Inquire current viewport limits
0225  C-------------------------------------------------------------------------
0226        CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0227        IF (IERR .EQ. 0) GO TO 577
0228          CALL ERRMS (1,IERR,6HZIWS  )
0229          GO TO 9999
0230  C-------------------------------------------------------------------------
0231  C  Calculate the lower left hand corner of the viewport and leave
0232  C  enough room for labels.  The viewport is reduced 12% on each side
0233  C  to give room for lables.  Set the new viewport
0234  C-------------------------------------------------------------------------
0235    577 MINX = .12 * VIEW(2)
0236        MAXX = .88 * VIEW(2)
0237        MINY = .12 * VIEW(4)
0238        MAXY = .88 * VIEW(4)
```

```
0239        CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0240  C-----------------------------------------------------------------------
0241  C  Now set the character size based on the size of the window
0242  C  The constants below produce a readable character size in the new
0243  C  window.
0244  C-----------------------------------------------------------------------
0245        XCSIZ = .015 * (WXMAX - WXMIN)
0246        YCSIZ = .025 * (WYMAX - WYMIN)
0247        CALL ZCSIZ (XCSIZ,YCSIZ)
0248  C
0249   9999 RETURN
0250        END
0251  C***********************************************************************
0252  C                          SUBROUTINE DRWDT
0253  C
0254  C  PURPOSE:       This subroutine draws the current graph.
0255  C
0256  C  DESCRIPTION:   This subroutine clears the alphanumeric and graphics
0257  C                 displays.  It then draws the current graph.  Note
0258  C                 that if the user has not changed any data values
0259  C                 the default values will be used.
0260  C
0261  C  CALLING SEQUENCE:  CALL DRWDT
0262  C
0263  C  PARAMETERS:    NONE
0264  C
0265  C***********************************************************************
0266  C
0267        SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IEND)
0268        REAL DAT(1002,2)
0269        DIMENSION ILIST(3)
0270        INTEGER TEXT(12),OPCODE,RSIZE
0271  C
0272        REAL VIEW(4)
0273        DATA MARKNO/6/
0274  C
0275  C  VIEW     -  Temp holder of viewport bounds
0276  C
0277  C***********************************************************************
0278  C
0279  C  Clear the graphics and alphanumeric displays
0280  C-----------------------------------------------------------------------
0281        CALL ZNEWF
0282        CALL CLEAR
0283  C-----------------------------------------------------------------------
0284  C  Determine parameters for LAXES call.  Search thru data for YMAX.
0285  C-----------------------------------------------------------------------
0286  C-----------------------------------------------------------------------
0287        XTIC = (XMAX-XMIN)/10.0
0288        YTIC = (YMAX-YMIN) / 10.0
0289        XORG = XMIN
0290        YORG = YMIN
0291        XMJC = 1.0
0292        YMJC = 1.0
0293        TSIZE = .02
0294        CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0295  C-----------------------------------------------------------------------
0296  C  Plot the graph.
0297  C-----------------------------------------------------------------------
0298        CALL ZMOVE(DAT(3,1),DAT(3,2))
```

```
0299         DO 5000 I=4,IEND+2
0300         CALL ZDRAW(DAT(I,1),DAT(I,2))
0301    5000 CONTINUE
0302   C-------------------------------------------------------------------
0303   C  Change the viewport to the maximum posible so text strings may be
0304   C  placed anywhere on the view surface.  Output the text strings, then
0305   C  reset the viewport.
0306   C-------------------------------------------------------------------
0307    6000  CALL VPMAX (VIEW)
0308         TEXT(1) = 2HRe
0309         TEXT(2) = 2Hlo
0310         TEXT(3) = 2Hti
0311         TEXT(4) = 2Hve
0312         TEXT(5) = 2H P
0313         TEXT(6) = 2Hos
0314         TEXT(7) = 2Hit
0315         TEXT(8) = 2Hio
0316         TEXT(9) = 2Hn
0317         TEXT(10) = 2H(m
0318         TEXT(11) = 2Hm)
0319         TEXT(12) = 6412B
0320         NMTEXT = 24
0321         XTEXT = 0.0
0322         YTEXT = YMIN + (YMAX-YMIN)/21.0
0323   C
0324         CALL ZMOVE (XTEXT,YTEXT)
0325         OPCODE=1052
0326         ISIZE=1
0327         RSIZE=0
0328         ILIST(1)=6
0329         CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0330         IF (IERR .EQ. 0) GO TO 6010
0331           CALL ERRMS (1,IERR,6HZOESC )
0332    6010  CALL ZTEXT (NMTEXT,TEXT)
0333   C
0334   C       CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0335   C       IF (IERR .EQ. 0) GO TO 6020
0336   C         CALL ERRMS (1,IERR,6HZIESC )
0337   C         GO TO 9999
0338    6020  TEXT(1) = 2HAm
0339         TEXT(2) = 2Hpl
0340         TEXT(3) = 2Hit
0341         TEXT(4) = 2Hud
0342         TEXT(5) = 2He
0343         TEXT(6) = 2H(d
0344         TEXT(7) = 2Hb)
0345         TEXT(8) = 6412B
0346         NMTEXT = 16
0347         XTEXT = XMIN + (XMAX -XMIN)/30.0
0348         YTEXT = YMIN + (YMAX-YMIN)/2.0
0349         OPCODE = 1050
0350         ILIST(1) = 1
0351         ISIZE = 1
0352         RSIZE = 0
0353         CALL ZMOVE(XTEXT,YTEXT)
0354         CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0355         IF (IERR .EQ. 0) GO TO 6030
0356           CALL ERRMS (1,IERR,6HZOESC )
0357           GO TO 9999
0358    6030  CALL ZTEXT(NMTEXT,TEXT)
```

```
0359          OPCODE=1050
0360          ILIST(1) = 0
0361          ISIZE = 1
0362          RSIZE = 0
0363          CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0364          IF (IERR .EQ. 0) GO TO 6040
0365            CALL ERRMS (1,IERR,6HZOESC )
0366            GO TO 9999
0367  C
0368   6040   CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0369          CALL ZMCUR
0370  C
0371   9999   RETURN
0372          END
0373  C
0374  C*************************************************************************
0375  C                              SUBROUTINE ERRMS
0376  C
0377  C  PURPOSE:       To write out an error message.
0378  C
0379  C  DESCRIPTION:   This subroutine writes an error message to the alphanumeric
0380  C                 LU.  The error number and DGL subroutine name that the error
0381  C                 occured during is reported.
0382  C
0383  C  CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0384  C
0385  C  PARAMETERS:
0386  C                 ALPHLU:    [INTEGER];  The alphanumeric LU
0387  C
0388  C                 ERROR:     [INTEGER];  The error number of the error to
0389  C                                        reported
0390  C
0391  C                 SUBR:      [INTEGER];  An array containing the name of
0392  C                                        the subroutine where the error occured
0393  C
0394  C*************************************************************************
0395  C
0396        SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0397        INTEGER ALPHLU,ERROR,SUBR(3)
0398  C
0399  C  Write out the error message
0400  C
0401        CALL ZMCUR
0402        WRITE(ALPHLU,100) ERROR, SUBR
0403    100 FORMAT(" Error ",I2," occured in subroutine ",3A2)
0404  C
0405        RETURN
0406        END
0407  C
0408  C*************************************************************************
0409  C                    SUBROUTINE CLEAR
0410  C
0411  C  PURPOSE:       To clear the alphanumeric display
0412  C
0413  C  DESCRIPTION:   This subroutine will clear the alphanumeric display
0414  C                 of a HP 2647 or HP 2648 terminal.  If the display is
0415  C                 not a HP 2647 or HP 2648 then the call has no effect.
0416  C
0417  C  CALLING SEQUENCE: CALL CLEAR
0418  C
```

```
C  PARAMETERS:        NONE
C
C*************************************************************************
C
      SUBROUTINE CLEAR
      INTEGER ILIST(7), STRING(2), IERR
      REAL DUMMY
C
C  ILIST  - Information list returned by ZIWS
C  IERR   - Error information returned by ZIWS (not used here)
C  DUMMY  - Real information returned by ZIWS (none in this case)
C  STRING - Device-dependent commands that clear a 264X terminal
C
      DATA STRING /15550B,                15512B/
C                  /    \                /    \
C              33B   +  150B          33B   +  112B
C              esc       h            esc       J
C              (home cursor)         (clear display)
C
C*************************************************************************
C
C  Inquire the status of the alphanumeric device:
C  upon return, ILIST(4) = -1  ==> no alpha device,
C                        =  0  ==> it is disabled,
C                        =  1  ==> it is enabled.
C  If it is not enabled, just return.
C
      CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
      IF (IERR .EQ. 0) GO TO 7070
        CALL ERRMS (1,IERR,6HZIWS  )
        GO TO 9999
 7070 IF (ILIST(4) .NE. 1) GOTO 9999
C
C  Alpha device is enabled. Make sure it is '264X' type then clear.
C
      IF (ILIST(1) .NE. 2H26) GOTO 9999
      IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
      CALL ZALPH (4,STRING)
C
 9999 RETURN
      END
C
C*************************************************************************
C
C                              SUBROUTINE VPMAX
C
C  PURPOSE:       Set the viewport to the maximum limits.
C
C  DESCRIPTION:   The current viewport is saved in VIEW.  The viewport
C                 is then set to the maximum limits.
C
C  CALLING SEQUENCE:  CALL VPMAX (VIEW)
C
C  PARAMETERS:
C                 VIEW:  [REAL ARRAY OF 4];  This array contains the
C                                            viewport before it was
C                                            maxumized.
C
C*************************************************************************
C
```

```
0479         SUBROUTINE VPMAX (VIEW)
0480         REAL VIEW(4)
0481   C
0482         INTEGER IDUM
0483         REAL AR(2), NEWX, NEWY
0484   C
0485   C  IDUM    - Dummy work variable
0486   C  AR      - Temp holder of the aspect ratio
0487   C  NEWX    - Temp work variable
0488   C  NEWY    - Temp work variable
0489   C
0490   C*************************************************************************
0491   C
0492   C  Inquire current viewport and save it in array VIEW
0493   C
0494         CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0495         IF (IERR .EQ. 0) GO TO 8080
0496           CALL ERRMS (1,IERR,6HZIWS  )
0497           GO TO 9999
0498   C
0499   C  Inquire the maximum aspect ratio
0500   C
0501    8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0502   C
0503   C  Set viewport to maximum dimensions
0504   C
0505         NEWY = 1.
0506         NEWX = 1.
0507         IF (AR(2) .LE. 1.) NEWY = AR(2)
0508         IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0509         CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0510   C
0511    9999 RETURN
0512         END
0513         END$
```

```
&WR10  T=00003 IS ON CR00015 USING 00020 BLKS R=0000

0001  FTN4
0002  C
0003  C      ********************************************************************
0004  C      *                                                                  *
0005  C      *            GENERAL PURPOSE S11 MEASUREMENT PROGRAM               *
0006  C      *                                                                  *
0007  C      *            ++++++++++++++++++++++++++++++++++                    *
0008  C      *                                                                  *
0009  C      *     FOR:   Walter Reed Army Institute of Research                *
0010  C      *            Department of Microwave Research                      *
0011  C      *            Walter Reed Army Medical Center                       *
0012  C      *            Washington, DC                                        *
0013  C      *            20012                                                 *
0014  C      *                                                                  *
0015  C      *            ++++++++++++++++++++++++++++++++++                    *
0016  C      *                                                                  *
0017  C      *      BY:   Technology-USA, Inc.                                  *
0018  C      *            P.O. Box 55333                                        *
0019  C      *            Fort Washington, Maryland  20744                      *
0020  C      *            Phone: (301) 292-2592                                 *
0021  C      *                                                                  *
0022  C      *  ------------------------------------------------------------    *
0023  C      *     This program measures S11 at every frequency in the          *
0024  C      *  calibration list. It also provides a listing of the data.       *
0025  C      *                                                                  *
0026  C      ********************************************************************
0027  C
0028        PROGRAM WR10
0029  C
0030  C-----------------------------------------------------------------------
0031  C  Define block common array and the variables which are in the array.
0032  C-----------------------------------------------------------------------
0033  C
0034        INTEGER CRT,PRINT
0035        COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,NONLY,
0036       *CM(4,112),IHEAD(40),IDATE(15)
0037        DIMENSION J(20),ITIME(15),IBUF(41),IREG(2),NBUF(41)
0038        EQUIVALENCE (D,J),(REG,IREG)
0039        CRT=1
0040        PRINT=6
0041        FF=20014B
0042        IRPT=0
0043  C-----------------------------------------------------------------------
0044  C  Display heading on the CRT.
0045  C-----------------------------------------------------------------------
0046        IHOME=15510B
0047        ICLEAR=15512B
0048        WRITE(CRT,9500) IHOME,ICLEAR
0049        WRITE(CRT,910)
0050   910  FORMAT(
0051       *10X,"********************************************************",/,
0052       *10X,"*                    PROGRAM  WR10                     *",/,
0053       *10X,"*       GENERAL PURPOSE S11 MEASUREMENT PROGRAM        *",/,
0054       *10X,"********************************************************","/,
0055       *"")
0056  C-----------------------------------------------------------------------
0057  C  Call subroutine FILE2 to read the block common data from the disk
0058  C  file and transfer it to the array AGS2C.
```

```
0059  C
0060  C  Display the date on which this data was acquired, the starting frequency,
0061  C  the step size, and the number of steps in the frequency list.
0062  C-----------------------------------------------------------------------
0063        CALL FILE2(1)
0064        WRITE(CRT,1020) (IDATE(I), I=1,15)
0065   1020 FORMAT(3/,"Calibration data was taken on ..... ",15A2)
0066  C     WRITE(CRT,1030) D(1),D(2),D(3)
0067   1030 FORMAT(1/,"Starting Freq.  = "F8.3" MHz",
0068       */,"Step Size        = " F8.3" MHz",/"Number of steps = "I3)
0069        WRITE(CRT,1050)
0070   1050 FORMAT(3/,"Do you wish to recalibrate ? (YES/NO)   _")
0071        IANS=2H
0072        READ (CRT,9502) IANS
0073        IF (IANS.EQ.2HYE) GO TO 9000
0074  C-----------------------------------------------------------------------
0075  C  Measure and correct data.
0076  C-----------------------------------------------------------------------
0077   1500 WRITE (CRT,9500) IHOME,ICLEAR
0078        WRITE (CRT,1510)
0079   1510 FORMAT (1/,5X,"Press RETURN to start the measurement.   _")
0080        READ (CRT,9502) IANS
0081        WRITE (CRT,1520)
0082   1520 FORMAT (3/,5X,"Measurement in process.     _")
0083   1600 CALL CORS4(1,4,1)
0084  C-----------------------------------------------------------------------
0085  C  Print heading on the line printer.
0086  C-----------------------------------------------------------------------
0087        WRITE(PRINT,2000)
0088   2000 FORMAT(2/,
0089       *10X,"*************************************************************",/,
0090       *10X,"*                                                           *",/,
0091       *10X,"*       Walter Reed Army Institute of Research              *",/,
0092       *10X,"*       Department of Microwave Research                    *",/,
0093       *10X,"*       Walter Reed Army Medical Center                     *",/,
0094       *10X,"*       Washington, DC 20012                                *",/,
0095       *10X,"*                                                           *",/,
0096       *10X,"*************************************************************")
0097        WRITE (CRT,9500) IHOME,ICLEAR
0098        IF (IRPT.GT.0) GOTO 2055
0099        WRITE (CRT,2050)
0100   2050 FORMAT (1/,5X,"Enter first line of title for the data list.",
0101       *2/,5X,"(Press RETURN if no title is to be printed.)",
0102       *2/)
0103        REG=EXEC(1,401B,IBUF,41)
0104        IF (IREG(2).EQ.0) GO TO 2100
0105        LINE1=IREG(2)
0106   2055 WRITE (PRINT,9501)
0107        WRITE (PRINT,9503) (IBUF(I),I=1,LINE1)
0108        WRITE (CRT,2060)
0109   2060 FORMAT (1/,5X,"Enter second line of title for the data list.",
0110       *2/,5X,"Press RETURN if no second line is to be printed.)",
0111       *2/)
0112        REG=EXEC(1,401B,NBUF,41)
0113        IF (IREG(2).EQ.0) GO TO 2100
0114        LINE2=IREG(2)
0115        WRITE (PRINT,9503) (NBUF(I),I=1,LINE2)
0116   2100 CALL FTIME (ITIME)
0117        WRITE (PRINT,2105) (ITIME(I),I=1,15)
0118   2105 FORMAT (2/,10X,"Measurement Date: ",15A2)
```

```
0119         WRITE (PRINT,2110) (IDATE(I),I=1,15)
0120    2110 FORMAT (1/,10X,"Calibration Date: ",15A2)
0121         WRITE (PRINT,2500)
0122    2500 FORMAT (3/,
0123        *10X,"  Frequency            S11                VSWR       Return",/,
0124        *10X,"    (MHz)       ------------------"15X"   Loss (dB)",/,
0125        *10X,"                Magnitude    Phase",/)
0126    C-------------------------------------------------------------------------
0127    C  Print the data.
0128    C-------------------------------------------------------------------------
0129         CALL CALF2(4,M,F)
0130         DO 3900 I=1,M
0131         IF (IFBRK(IDUM)) 9100,3100                                        R1.1
0132    3100 CALL CALF2(2,I,F)
0133         CALL CPOL2(CM(1,I),X,Y)
0134         VSWR = ((1+X)/(1-X))
0135         RLOSS =-10*ALOGT(X**2)
0136         IF (X. GE. 0.9802) X=0.9802
0137         IF (X .GE. 0.98) VSWR=100.0
0138         IF (X .GE. 0.98) RLOSS =0.174
0139         WRITE (PRINT,3200) F,X,Y,VSWR,RLOSS
0140    3200 FORMAT (10X,F10.3,2X,F10.4,2X,F9.1,5X,F7.3,5X,F7.3)
0141    3900 CONTINUE
0142         WRITE (PRINT,9504)
0143    C-------------------------------------------------------------------------
0144    C  Ask operator if he wants another measurement.
0145    C-------------------------------------------------------------------------
0146         WRITE (CRT,4050)
0147    4050 FORMAT (1/,5X,"Do you wish to make another run ? (YES/NO)    _")
0148         READ (CRT,9502) IANS
0149         IF (IANS.NE.2HYE) GO TO 9100
0150         IRPT=1
0151         WRITE (CRT,9500) IHOME,ICLEAR
0152         GO TO 1500
0153    C-------------------------------------------------------------------------
0154    C  Program termination.
0155    C-------------------------------------------------------------------------
0156    9000 WRITE (CRT,9010)
0157    9010 FORMAT (2/,"Run program AGS02 for new calibration.")
0158    9100 WRITE (CRT,9110)
0159    9110 FORMAT (3/,10X,
0160        *"**********  PROGRAM  WR10  TERMINATED  **********")
0161    C-------------------------------------------------------------------------
0162    C  Format statements.
0163    C-------------------------------------------------------------------------
0164    9500 FORMAT (2A2)
0165    9501 FORMAT (2/)
0166    9502 FORMAT (A2)
0167    9503 FORMAT (10X,40A2)
0168    9504 FORMAT (H1)
0169         END
0170         BLOCK DATA
0171         COMMON /AGS2C/ I(2330)
0172         END
0173         END$
```

```
&WR11  T=00004 IS ON CR32767 USING 00035 BLKS R=0176

0001  FTN4,L
0002  C
0003  C      ***************************************************************
0004  C      *                                                             *
0005  C      *            GENERAL PURPOSE S21 MEASUREMENT PROGRAM          *
0006  C      *                                                             *
0007  C      *            ++++++++++++++++++++++++++++++++++               *
0008  C      *                                                             *
0009  C      *     FOR:  Walter Reed Army Institute of Research            *
0010  C      *           Department of Microwave Research                  *
0011  C      *           Walter Reed Army Medical Center                   *
0012  C      *           Washington, DC                                    *
0013  C      *           20012                                             *
0014  C      *                                                             *
0015  C      *           ++++++++++++++++++++++++++++++++++                *
0016  C      *                                                             *
0017  C      *      BY:  Technology-USA, Inc.                              *
0018  C      *           P.O. Box 55333                                    *
0019  C      *           Fort Washington, Maryland  20744                  *
0020  C      *           Phone: (301) 292-2592                             *
0021  C      *                                                             *
0022  C      *  -------------------------------------------------------    *
0023  C      *     This program measures S21 at every frequency in the     *
0024  C      *  calibration list. It also provides a listing of the data.  *
0025  C      *                                                             *
0026  C      ***************************************************************
0027  C
0028        PROGRAM WR11
0029  C
0030  C-----------------------------------------------------------------------
0031  C  Define block common array and the variables which are in the array.
0032  C-----------------------------------------------------------------------
0033  C
0034        INTEGER CRT,PRINT
0035        COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,NONLY,
0036       *CM(4,112),IHEAD(40),IDATE(15)
0037        DIMENSION J(20),ITIME(15),IBUF(41),IREG(2),NBUF(41)
0038        EQUIVALENCE (D,J),(REG,IREG)
0039        CRT=1
0040        PRINT=6
0041        FF=20014B
0042        IRPT=0
0043  C-----------------------------------------------------------------------
0044  C  Display heading on the CRT.
0045  C-----------------------------------------------------------------------
0046        IHOME=15510B
0047        ICLEAR=15512B
0048        WRITE(CRT,9500) IHOME,ICLEAR
0049        WRITE(CRT,910)
0050   910  FORMAT(
0051       *10X,"*************************************************************",/,
0052       *10X,"*                      PROGRAM  WR11                        *",/,
0053       *10X,"*        GENERAL PURPOSE S21 MEASUREMENT PROGRAM            *",/,
0054       *10X,"*************************************************************",/,
0055       *"")
0056  C-----------------------------------------------------------------------
0057  C  Call subroutine FILE2 to read the block common data from the disk
0058  C  file and transfer it to the array AGS2C.
```

```
0059  C
0060  C  Display the date on which this data was acquired, the starting frequency,
0061  C  the step size, and the number of steps in the frequency list.
0062  C-----------------------------------------------------------------------
0063        CALL FILE2(1)
0064        WRITE(CRT,1020) (IDATE(I), I=1,15)
0065   1020 FORMAT(3/,"Calibration data was taken on ..... ",15A2)
0066        WRITE(CRT,1030) D(1),D(2),D(3)
0067   1030 FORMAT(1/,"Starting Freq.  = "F8.3" MHz",
0068       */,"Step Size        = " F8.3" MHz",/"Number of steps = "I3)
0069        WRITE(CRT,1050)
0070   1050 FORMAT(3/,"Do you wish to recalibrate ? (YES/NO)   _")
0071        IANS=2H
0072        READ (CRT,9502) IANS
0073        IF (IANS.EQ.2HYE) GO TO 9000
0074  C-----------------------------------------------------------------------
0075  C  Measure and correct data.
0076  C-------------------------------------------------------------
0077   1500 WRITE (CRT,9500) IHOME,ICLEAR
0078        WRITE (CRT,1510)
0079   1510 FORMAT (1/,5X,"Press RETURN to start the measurement.    _")
0080        READ (CRT,9502) IANS
0081        WRITE (CRT,1520)
0082   1520 FORMAT (3/,5X,"Measurement in process.     _")
0083   1600 CALL CORS3(1,4,1)
0084  C-----------------------------------------------------------------------
0085  C  Print heading on the line printer.
0086  C-----------------------------------------------------------------------
0087        WRITE(PRINT,2000)
0088   2000 FORMAT(2/,
0089       *10X,"*************************************************************",/,
0090       *10X,"*                                                           *",/,
0091       *10X,"*        Walter Reed Army Institute of Research             *",/,
0092       *10X,"*        Department of Microwave Research                   *",/,
0093       *10X,"*        Walter Reed Army Medical Center                    *",/,
0094       *10X,"*        Washington, DC 20012                               *",/,
0095       *10X,"*                                                           *",/,
0096       *10X,"*************************************************************")
0097        WRITE (CRT,9500) IHOME,ICLEAR
0098        IF (IRPT.GT.0) GOTO 2055
0099        WRITE (CRT,2050)
0100   2050 FORMAT (1/,5X,"Enter first line of title for the data list.",
0101       *2/,5X,"(Press RETURN if no title is to be printed.)",
0102       *2/)
0103        REG=EXEC(1,401B,IBUF,41)
0104        IF (IREG(2).EQ.0) GO TO 2100
0105        LINE1=IREG(2)
0106   2055 WRITE (PRINT,9501)
0107        WRITE (PRINT,9503) (IBUF(I),I=1,LINE1)
0108        WRITE (CRT,2060)
0109   2060 FORMAT (1/,5X,"Enter second line of title for the data list.",
0110       *2/,5X,"Press RETURN if no second line is to be printed.)",
0111       *2/)
0112        REG=EXEC(1,401B,NBUF,41)
0113        IF (IREG(2).EQ.0) GO TO 2100
0114        LINE2=IREG(2)
0115        WRITE (PRINT,9503) (NBUF(I),I=1,LINE2)
0116   2100 CALL FTIME (ITIME)
0117        WRITE (PRINT,2105) (ITIME(I),I=1,15)
0118   2105 FORMAT (2/,10X,"Measurement Date: ",15A2)
```

```
0119         WRITE (PRINT,2110) (IDATE(I),I=1,15)
0120    2110 FORMAT (1/,10X,"Calibration Date: ",15A2)
0121         WRITE (PRINT,2500)
0122    2500 FORMAT (3/,
0123        *10X,"  Frequency            S21                Insertion",/,
0124        *10X,"    (MHz)      ------------------"4X"   Loss (dB)",/,
0125        *10X,"                Magnitude    Phase",/)
0126    C-------------------------------------------------------------------------
0127    C  Print the data.
0128    C-------------------------------------------------------------------------
0129         CALL CALF2(4,M,F)
0130         DO 3900 I=1,M
0131         IF (IFBRK(IDUM)) 9100,3100                                        R1.1
0132    3100 CALL CALF2(2,I,F)
0133         CALL CPOL2(CM(2,I),X,Y)
0134         RLOSS =-10*ALOGT(X*X)                                             R1.2
0135         IF (X. GE. 0.9802) X=0.9802
0136         IF (X .GE. 0.98) RLOSS =0.174
0137         WRITE (PRINT,3200) F,X,Y,RLOSS
0138    3200 FORMAT (10X,F10.3,2X,F10.4,2X,F9.1,7X,F7.3)
0139    3900 CONTINUE
0140         WRITE (PRINT,9504)
0141    C-------------------------------------------------------------------------
0142    C  Ask operator if he wants another measurement.
0143    C-------------------------------------------------------------------------
0144         WRITE (CRT,4050)
0145    4050 FORMAT (1/,5X,"Do you wish to make another run ? (YES/NO)   _")
0146         READ (CRT,9502) IANS
0147         IF (IANS.NE.2HYE) GO TO 9100
0148         IRPT=1
0149         WRITE (CRT,9500) IHOME,ICLEAR
0150         GO TO 1500
0151    C-------------------------------------------------------------------------
0152    C  Program termination.
0153    C-------------------------------------------------------------------------
0154    9000 WRITE (CRT,9010)
0155    9010 FORMAT (2/,"Run program AGS02 for new calibration.")
0156    9100 WRITE (CRT,9110)
0157    9110 FORMAT (3/,10X,
0158        *"**********  PROGRAM  WR11  TERMINATED  **********")
0159    C-------------------------------------------------------------------------
0160    C  Format statements.
0161    C-------------------------------------------------------------------------
0162    9500 FORMAT (2A2)
0163    9501 FORMAT (2/)
0164    9502 FORMAT (A2)
0165    9503 FORMAT (10X,40A2)
0166    9504 FORMAT (H1)
0167         END
0168         BLOCK DATA
0169         COMMON /AGS2C/ I(2330)
0170         END
0171         END$
```

```
&WR12  T=00004 IS ON CR00010 USING 00028 BLKS R=0167

0001  FTN4,L
0002  C      ***************************************************************
0003  C      *                                                             *
0004  C      *            SUBROUTINE: WR12                                 *
0005  C      *                                                             *
0006  C      *            ++++++++++++++++++++++++++++++++++               *
0007  C      *                                                             *
0008  C      *      FOR:  Walter Reed Army Institute of Research           *
0009  C      *            Department of Microwave Research                 *
0010  C      *            Walter Reed Army Medical Center                  *
0011  C      *            Washington DC                                    *
0012  C      *            20112                                            *
0013  C      *                                                             *
0014  C      *            ++++++++++++++++++++++++++++++++++               *
0015  C      *                                                             *
0016  C      *       BY:  Technology-USA, Inc.                             *
0017  C      *            P.O. Box 55333                                   *
0018  C      *            Fort Washington, Maryland  20744                 *
0019  C      *            Phone: (301) 292-2592                            *
0020  C      *                                                             *
0021  C      *  -----------------------------------------------------      *
0022  C      *      Subroutine WR12 displays an error message on the CRT   *
0023  C      *   or any specified LU#.                                     *
0024  C      *                                                             *
0025  C      ***************************************************************
0026        SUBROUTINE WR12(LUN,ERRN,FL3,K,L,PRGNM,PRGNL)
0027        INTEGER ERRN,PRGNM,PRGNL,CLOSP
0028        DIMENSION PRGNM(PRGNL)
0029        LOGICAL FL3
0030        CLOSP=1H)
0031        J=2H
0032        I=ERRN/1000B
0033        IF (I .EQ. 0) I=6
0034        IF (I .LT. 10) GO TO 15
0035        J=I-(I/10)*10+2H00
0036        I=I/10
0037  15    WRITE(LUN,19) I,J,ERRN,(PRGNM(I),I=1,PRGNL),CLOSP
0038  19    FORMAT (1X,"ERROR # WR",I1,R1," - ",O5," ......(",6A1)
0039        IF (PRGNM(1) .NE. 2HW ) GO TO 50000
0040        IF (PRGNM(2) .NE. 2HR ) GO TO 50000
0041        IF (ERRN .NE. 1101B) GO TO 1103
0042          WRITE (LUN,1101)
0043  1101    FORMAT (1X,"Heidenhain for ZENITH axis is not set to ",
0044       *           "millimeter position.")
0045          IF (FL3) WRITE (LUN,1102)
0046  1102    FORMAT(1X,"Place switch in 'MM' position and rerun ",
0047       *           "the program.")
0048          RETURN
0049  1103  IF (ERRN .NE. 1102B) GO TO 1106
0050          WRITE(LUN,1104)
0051  1104    FORMAT(1X,"Program cannot read the measurement",
0052       *           " units from the ZENITH axis Heidenhain.")
0053          IF (FL3) WRITE (LUN,1105)
0054  1105    FORMAT(1X,"Set the power control lever on the right",
0055       *         " of the scanner control panel to 'ON'.")
0056          RETURN
0057  1106  IF ((ERRN-1100B)/10 .NE. 3) GO TO 1200
0058          WRITE (LUN,1107)
```

```
0059  1107    FORMAT (1X,"Heidenhain for ZENITH axis is sending ",
0060     *              "erroneous data.")
0061          IF (FL3) WRITE (LUN,1108)
0062  1108    FORMAT (1X,"Call system manager about problem with",
0063     *              " the VRZ-100 readout device for ZENITH.")
0064          RETURN
0065  1200   IF (ERRN .NE. 1201B) GO TO 1203
0066          WRITE(LUN,1201)
0067  1201    FORMAT (1X,"Heidenhain for AZIMUTH Axis is not set to ",
0068     *            "millimeter position.")
0069          IF (FL3) WRITE (LUN,1202)
0070  1202    FORMAT(1X,"Place switch in 'MM' position and rerun the program.")
0071          RETURN
0072  1203   IF (ERRN .NE. 1202B) GO TO 1206
0073          WRITE(LUN,1204)
0074  1204    FORMAT(1X,"Program cannot read the measurement",
0075     *            " units from the AZIMUTH axis Heidenhain.")
0076          IF (FL3) WRITE (LUN,1205)
0077  1205    FORMAT(1X,"Set the power control lever on the right",
0078     *            " of the scanner control panel to 'ON'.")
0079          RETURN
0080  1206   IF ((ERRN-1200B)/10 .NE. 3) GO TO 1400
0081          WRITE (LUN,1207)
0082  1207    FORMAT (1X,"Heidenhain for AZIMUTH axis is sending ",
0083     *              "erroneous data.")
0084          IF (FL3) WRITE (LUN,1208)
0085  1208    FORMAT (1X,"Call system manager about problem with",
0086     *              " the VRZ-100 readout device for AZIMUTH.")
0087          RETURN
0088  1400   IF (ERRN .NE. 1401B) GO TO 1403
0089          WRITE(LUN,1401)
0090  1401    FORMAT (1X,"Heidenhain for ELEVATION Axis is not set to ",
0091     *            "millimeter position.")
0092          IF (FL3) WRITE (LUN,1402)
0093  1402    FORMAT(1X,"Place switch in 'MM' position and rerun the program.")
0094          RETURN
0095  1403   IF (ERRN .NE. 1402B) GO TO 1406
0096          WRITE(LUN,1404)
0097  1404    FORMAT(1X,"Program cannot read the measurement",
0098     *            " units from the ELEVATION axis Heidenhain.")
0099          IF (FL3) WRITE (LUN,1405)
0100  1405    FORMAT(1X,"Set the power control lever on the right",
0101     *            " of the scanner control panel to 'ON'.")
0102          RETURN
0103  1406   IF ((ERRN-1400B)/10 .NE. 3) GO TO 3300
0104          WRITE (LUN,1407)
0105  1407    FORMAT (1X,"Heidenhain for ELEVATION axis is sending ",
0106     *              "erroneous data.")
0107          IF (FL3) WRITE (LUN,1408)
0108  1408    FORMAT (1X,"Call system manager about problem with ",
0109     *              "VRZ-100 readout device for ELEVATION.")
0110          RETURN
0111  3300   IF (ERRN .NE. 3301B) GO TO 3303
0112          WRITE(LUN,3301)
0113  3301    FORMAT (1X,"Farrand for ROTATION Axis is not set to ",
0114     *              "right setting.")
0115          IF (FL3) WRITE (LUN,3302)
0116  3302    FORMAT(1X,"Put Farrand in right setting and rerun ",
0117     *              "the program.")
0118          RETURN
```

```
0119  3303  IF (ERRN .NE. 3302B) GO TO 3306
0120          WRITE(LUN,3304)
0121  3304    FORMAT(1X,"Program cannot read the measurement",
0122       *            " units from the ROTATION axis Farrand.")
0123          IF (FL3) WRITE (LUN,3305)
0124  3305    FORMAT(1X,"Call system manager about problem with",
0125       *         " VRZ-100 readout device for ROTATION.")
0126          RETURN
0127  3306  IF ((ERRN-3300B)/10 .NE. 3) GO TO 6100
0128          WRITE (LUN,3307)
0129  3307    FORMAT(1X,"Farrand for ROTATION axis is sending ",
0130       *            "erroneous data.")
0131          IF (FL3) WRITE (LUN,3308)
0132  3308    FORMAT(1X,"Call system manager about problem with ",
0133       *            "the VRZ-100 readout device for ROTATION.")
0134          RETURN
0135  6100  IF (ERRN .NE. 101B) GO TO 6103
0136          WRITE(LUN,6101)
0137  6101    FORMAT (1X,"Heidenhain for ZENITH Axis is not set to ",
0138       *            "millimeter position.")
0139          IF (FL3) WRITE (LUN,6102)
0140  6102    FORMAT(1X,"Place switch in 'MM' position and rerun ",
0141       *            "the program.")
0142          RETURN
0143  6103  IF (ERRN .NE. 102B) GO TO 6106
0144          WRITE(LUN,6104)
0145  6104    FORMAT(1X,"Program cannot read the measurement",
0146       *            " units from the ZENITH axis Heidenhain.")
0147          IF (FL3) WRITE (LUN,6105)
0148  6105    FORMAT(1X,"Call system manager about problem with",
0149       *         " the VRZ-100 readout device for ZENITH.")
0150          RETURN
0151  6106  IF (ERRN .NE. 103B) GO TO 6109
0152          WRITE (LUN,6107)
0153  6107    FORMAT(1X,"There is no power to the ZENITH motor.")
0154          IF (FL3) WRITE (LUN,6108)
0155  6108    FORMAT(1X,"Set the power control lever on the right",
0156       *         " of the scanner control panel to 'ON'.")
0157          RETURN
0158  6109  IF (ERRN .NE. 104B) GO TO 6112
0159          WRITE (LUN,6110)
0160  6110    FORMAT (1X,"The COMPUTER/MANUAL switch is not set to",
0161       *          " the computer position.")
0162          IF (FL3) WRITE (LUN,6111)
0163  6111    FORMAT (1X,"Set the mode switch to the computer position",
0164       *          " and run the program again.")
0165          RETURN
0166  6112  IF (ERRN .NE. 105B) GO TO 6115
0167          WRITE (LUN,6113)
0168  6113    FORMAT(1X,"Time out while reading from the ",
0169       *            "ZENITH axis Heidenhain.")
0170          IF (FL3) WRITE (LUN,6114)
0171  6114    FORMAT (1X,"Call system manager about problem with ",
0172       *          "the VRZ-100 readout device for ZENITH.")
0173          RETURN
0174  6115  IF (ERRN .NE. 106B) GO TO 6118
0175          WRITE (LUN,6116)
0176  6116    FORMAT (1X,"Unable to reach the desired ZENITH ",
0177       *          "position after 1024 tries.")
0178          IF (FL3) WRITE (LUN,6117)
```

```
0179  6117    FORMAT (1X,"Call system manager about problem with",
0180     *           " ZENITH controller, motor, or drive.")
0181            RETURN
0182  6118   IF (ERRN .NE. 110B) GO TO 6121
0183            WRITE (LUN,6119)
0184  6119    FORMAT (1X,"The ZENITH axis + direction limit switch ",
0185     *           "has been tripped.")
0186            IF (FL3) WRITE (LUN,6120)
0187  6120    FORMAT (1X,"Move in the - direction on ZENITH axis.")
0188            RETURN
0189  6121   IF (ERRN .NE. 120B) GO TO 6200
0190            WRITE (LUN,6122)
0191  6122    FORMAT (1X,"The ZENITH axis - direction limit switch ",
0192     *           "has been tripped.")
0193            IF (FL3) WRITE (LUN,6123)
0194  6123    FORMAT (1X,"Move in the + direction on ZENITH axis.")
0195            RETURN
0196  6200   IF (ERRN .NE. 201B) GO TO 6203
0197            WRITE(LUN,6201)
0198  6201    FORMAT (1X,"Heidenhain for AZIMUTH Axis is not set to ",
0199     *         "millimeter position.")
0200            IF (FL3) WRITE (LUN,6202)
0201  6202    FORMAT(1X,"Place switch in 'MM' position and rerun the program.")
0202            RETURN
0203  6203   IF (ERRN .NE. 202B) GO TO 6206
0204            WRITE(LUN,6204)
0205  6204    FORMAT(1X,"Program cannot read the measurement",
0206     *           " units from the AZIMUTH axis Heidenhain.")
0207            IF (FL3) WRITE (LUN,6205)
0208  6205    FORMAT(1X,"Call system manager about problem with",
0209     *           " the VRZ-100 readout device for AZIMUTH.")
0210            RETURN
0211  6206   IF (ERRN .NE. 203B) GO TO 6209
0212            WRITE (LUN,6207)
0213  6207    FORMAT(1X,"There is no power to the AZIMUTH motor.")
0214            IF (FL3) WRITE (LUN,6208)
0215  6208    FORMAT(1X,"Set the power control lever on the right",
0216     *           " of the scanner control panel to 'ON'.")
0217            RETURN
0218  6209   I  (ERRN .NE. 204B) GO TO 6212
0219             RITE (LUN,6210)
0220  6210    FORMAT (1X,"The COMPUTER/MANUAL switch is not set to",
0221     *           " the computer position.")
0222            IF (FL3) WRITE (LUN,6211)
0223  6211    FORMAT (1X,"Set the mode switch to the computer position",
0224     *           " and run the program again.")
0225            RETURN
0226  6212   IF (ERRN .NE. 205B) GO TO 6215
0227            WRITE (LUN,6213)
0228  6213    FORMAT(1X,"Time out while reading from the ",
0229     *           "AZIMUTH axis Heidenhain.")
0230            IF (FL3) WRITE (LUN,6214)
0231  6214    FORMAT (1X,"Call system manager about problem with ",
0232     *           "the VRZ-100 readout device for AZIMUTH.")
0233            RETURN
0234  6215   IF (ERRN .NE. 206B) GO TO 6218
0235            WRITE (LUN,6216)
0236  6216    FORMAT (1X,"Unable to reach the desired AZIMUTH ",
0237     *           "position after 1024 tries.")
0238            IF (FL3) WRITE (LUN,6217)
```

```
0239  6217    FORMAT (1X,"Call system manager about problem with"
0240       *          " AZIMUTH motor, controller, or drive.")
0241          RETURN
0242  6218   IF (ERRN .NE. 210B) GO TO 6221
0243          WRITE (LUN,6219)
0244  6219    FORMAT (1X,"The AZIMUTH axis + direction limit switch ",
0245       *          "has been tripped.")
0246          IF (FL3) WRITE (LUN,6220)
0247  6220    FORMAT (1X,"Move in the - direction on AZIMUTH axis.")
0248          RETURN
0249  6221   IF (ERRN .NE. 220B) GO TO 6300
0250          WRITE (LUN,6222)
0251  6222    FORMAT (1X,"The AZIMUTH axis - direction limit switch ",
0252       *          "has been tripped.")
0253          IF (FL3) WRITE (LUN,6223)
0254  6223    FORMAT (1X,"Move in the + direction on AZIMUTH axis.")
0255          RETURN
0256  6300   IF (ERRN .NE. 301B) GO TO 6303
0257          WRITE(LUN,6301)
0258  6301    FORMAT (1X,"Farrand for ROTATION Axis is not set to ",
0259       *            "right setting.")
0260          IF (FL3) WRITE (LUN,6302)
0261  6302    FORMAT(1X,"Put Farrand in right setting and rerun ",
0262       *            "the program.")
0263          RETURN
0264  6303   IF (ERRN .NE. 302B) GO TO 6306
0265          WRITE(LUN,6304)
0266  6304    FORMAT(1X,"Program cannot read the measurement",
0267       *            " units from the ROTATION axis Farrand.")
0268          IF (FL3) WRITE (LUN,6305)
0269  6305    FORMAT(1X,"Call system manager about problem with",
0270       *          " VRZ-100 readout device for ROTATION.")
0271          RETURN
0272  6306   IF (ERRN .NE. 303B) GO TO 6309
0273          WRITE (LUN,6307)
0274  6307    FORMAT(1X,"There is no power to the ROTATION motor.")
0275          IF (FL3) WRITE (LUN,6308)
0276  6308    FORMAT(1X,"Set the power control lever on the right",
0277       *          " of the scanner control panel to 'ON'.")
0278          RETURN
0279  6309   IF (ERRN .NE. 304B) GO TO 6312
0280          WRITE (LUN,6310)
0281  6310    FORMAT (1X,"The COMPUTER/MANUAL switch is not set to",
0282       *          " the computer position.")
0283          IF (FL3) WRITE (LUN,6311)
0284  6311    FORMAT (1X,"Set the mode switch to the computer position",
0285       *          " and run the program again.")
0286          RETURN
0287  6312   IF (ERRN .NE. 305B) GO TO 6315
0288          WRITE (LUN,6313)
0289  6313    FORMAT(1X,"Time out while reading from the ",
0290       *            "ROTATION axis Farrand.")
0291          IF (FL3) WRITE (LUN,6314)
0292  6314    FORMAT (1X,"Call system manager about problem with ",
0293       *          "VRZ-100 readout device for ROTATION.")
0294          RETURN
0295  6315   IF (ERRN .NE. 306B) GO TO 6318
0296          WRITE (LUN,6316)
0297  6316    FORMAT (1X,"Unable to reach the desired ROTATION ",
0298       *          "position after 1024 tries.")
```

```
0299            IF (FL3) WRITE (LUN,6317)
0300   6317     FORMAT (1X,"Call system manager about problem with",
0301          *           " ROTATION controller, motor, or drive.")
0302            RETURN
0303   6318   IF (ERRN .NE. 310B) GO TO 6321
0304            WRITE (LUN,6319)
0305   6319     FORMAT (1X,"The ROTATION axis CCW direction limit switch ",
0306          *           "has been tripped.")
0307            IF (FL3) WRITE (LUN,6320)
0308   6320     FORMAT (1X,"Move in the CW direction on ROTATION axis.")
0309            RETURN
0310   6321   IF (ERRN .NE. 320B) GO TO 6400
0311            WRITE (LUN,6322)
0312   6322     FORMAT (1X,"The ROTATION axis CW direction limit switch ",
0313          *           "has been tripped.")
0314            IF (FL3) WRITE (LUN,6323)
0315   6323     FORMAT (1X,"Move in the CCW direction on ROTATION axis.")
0316            RETURN
0317   6400   IF (ERRN .NE. 401B) GO TO 6403
0318            WRITE(LUN,6401)
0319   6401     FORMAT (1X,"Heidenhain for ELEVATION Axis is not set to ",
0320          *          "millimeter position.")
0321            IF (FL3) WRITE (LUN,6402)
0322   6402    FORMAT(1X,"Place switch in 'MM' position and rerun the program.")
0323            RETURN
0324   6403   IF (ERRN .NE. 402B) GO TO 6406
0325            WRITE(LUN,6404)
0326   6404     FORMAT(1X,"Program cannot read the measurement",
0327          *           " units from the ELEVATION axis Heidenhain.")
0328            IF (FL3) WRITE (LUN,6405)
0329   6405     FORMAT(1X,"Call system manager about problem with",
0330          *           " VRZ-100 readout device for ELEVATION.")
0331            RETURN
0332   6406   IF (ERRN .NE. 403B) GO TO 6409
0333            WRITE (LUN,6407)
0334   6407     FORMAT(1X,"There is no power to the ELEVATION motor.")
0335            IF (FL3) WRITE (LUN,6408)
0336   6408     FORMAT(1X,"Set the power control lever on the right",
0337          *           " of the scanner control panel to 'ON'.")
0338            RETURN
0339   6409   IF (ERRN .NE. 404B) GO TO 6412
0340            WRITE (LUN,6410)
0341   6410     FORMAT (1X,"The COMPUTER/MANUAL switch is not set to",
0342          *           " the computer position.")
0343            IF (FL3) WRITE (LUN,6411)
0344   6411     FORMAT (1X,"Set the mode switch to the computer position",
0345          *           " and run the program again.")
0346            RETURN
0347   6412   IF (ERRN .NE. 405B) GO TO 6415
0348            WRITE (LUN,6413)
0349   6413     FORMAT(1X,"Time out while reading from the ",
0350          *           "ELEVATION axis Heidenhain.")
0351            IF (FL3) WRITE (LUN,6414)
0352   6414     FORMAT (1X,"Call system manager about problem with ",
0353          *           "VRZ-100 readout device for ELEVATION.")
0354            RETURN
0355   6415   IF (ERRN .NE. 406B) GO TO 6418
0356            WRITE (LUN,6416)
0357   6416     FORMAT (1X,"Unable to reach the desired ELEVATION ",
0358          *           "position after 1024 tries.")
```

```
0359            IF (FL3) WRITE (LUN,6417)
0360   6417     FORMAT (1X,"Call system manager about problem with"
0361          *           " ELEVATION motor, controller, or drive.")
0362            RETURN
0363   6418   IF (ERRN .NE. 410B) GO TO 6421
0364            WRITE (LUN,6419)
0365   6419     FORMAT (1X,"The Elevation axis + direction limit switch ",
0366          *           "has been tripped.")
0367            IF (FL3) WRITE (LUN,6420)
0368   6420     FORMAT (1X,"Move in the - direction on Elevation axis.")
0369            RETURN
0370   6421   IF (ERRN .NE. 420B) GO TO 50000
0371            WRITE (LUN,6422)
0372   6422     FORMAT (1X,"The Elevation axis - direction limit switch ",
0373          *           "has been tripped.")
0374            IF (FL3) WRITE (LUN,6423)
0375   6423     FORMAT (1X,"Move in the + direction on Elevation axis.")
0376            RETURN
0377   50000 RETURN
0378          END
```

```
&WR13M T=00004 IS ON CR00010 USING 00008 BLKS R=0052

0001  FTN4,L
0002  C 24998-18466 REV.2040 (810304.1057)
0003  C*****************************************************************************
0004  C
0005  C                          PROGRAM WR13
0006  C
0007  C  DESCRIPTION:
0008  C   WR13 is designed to obtain microwave transmission data at different
0009  C   points along a scan and at different angles and to store the data
0010  C   in a disc file.
0011  C   This program has been divided into four segments because it
0012  C   cannot fit into memory otherwise.  The main segment always remains
0013  C   in memory.  The main segment merely calls EXEC(8,WR13C) to read
0014  C   in the control segment, WR13C, and pass control to it.  The other
0015  C   two segments are WR13G, which plots a graph on the plotter and
0016  C   WR13T, which plots a graph on the terminal.  Segment WR13C gives
0017  C   the user the option of plotting either on the plotter of the CRT
0018  C   for each run.  Therefor each run uses three segments: 1. the main
0019  C   segment, WR13. 2. the control segment, WR13C. 3. a graphing
0020  C   segment, either WR13G or WR13T.  The two segments besides the
0021  C   the main segment overlay each other by one segment calling
0022  C   EXEC(8, other segment name) to read in the other segment over
0023  C   the calling segment and then pass control to it.  It can
0024  C   return to the calling segment only by calling EXEC(8, calling
0025  C   segment name) again.
0026  C   This segment is the main segment.  It is run by typing in:
0027  C                    RU,WR13
0028  C   This segment only defines common, initializes variables, and
0029  C   then calls EXEC(8,WR13C) to read in and pass control to segment
0030  C   WR13C.
0031  C
0032  C*****************************************************************************
0033  C
0034        PROGRAM WR13
0035  C
0036        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0037       *          ISIZE(2),ITITL(40),PLUNIT(2)
0038        INTEGER CRT,PRNT
0039        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0040       *       IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IREND,PRESRO,IDCB,NAMEF,
0041       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0042       *       PLUNIT,ITITL,PRNT,IGRLOC
0043        COMMON/AGS2C/ D(10)
0044        IRNUM = 1
0045        CRT = 1
0046        IPRNM(1) = 1HW
0047        IPRNM(2) = 1HR
0048        IPRNM(3) = 1H1
0049        IPRNM(4) = 1H3
0050        IPRNL = 4
0051        MESS = -1
0052        ASTEPS = 5
0053        IAEND  = 4
0054        RSTEPS = 30
0055        IREND  =  3
0056        IPEND = 1
0057        ISEND = 1
0058        IDONE = 0
```

```
0059          PRESAZ = 999.9
0060          IPFLAG = 1
0061          ILFLAG = 1
0062          PLUNIT(1) = 4H - C
0063          PLUNIT(2) = 4HRT
0064          IGRLOC = 1
0065          NAMEF(1) = 2HSR
0066          NAMEF(2) = 2HS2
0067          NAMEF(3) = 2H1@
0068          PRNT = 6
0069          CALL FILE2(1)
0070          TEMP1 = D(1)
0071          TEMP2 = (D(3) - 1) * D(2) + D(1)
0072          RFREQ = D(1)
0073    C-----------------------------------------------------------------
0074    C  Call EXEC to read in segment WR13C and pass control to it.
0075    C-----------------------------------------------------------------
0076    C
0077          ICODE=8
0078          INAME(1)=2HWR
0079          INAME(2)=2H13
0080          INAME(3)=2HC
0081          CALL EXEC (ICODE, INAME)
0082          END
0083    C
0084    C  Block data routine for AGS2C
0085    C
0086          BLOCK DATA AGS2C
0087          COMMON /AGS2C/ I(2330)
0088          END
0089          END$
```

```
&WR13C T=00004 IS ON CR00002 USING 00078 BLKS R=0431

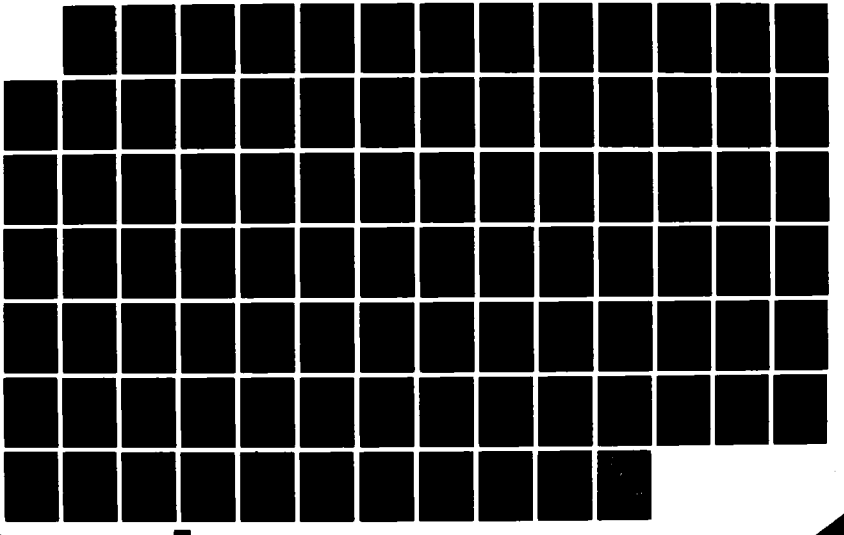
0001  FTN4,L
0002  C      ****************************************************************
0003  C      *                                                              *
0004  C      *            SEGMENT:  WR13C                                   *
0005  C      *                                                              *
0006  C      *            ++++++++++++++++++++++++++++++++++++++            *
0007  C      *      FOR:  Walter Reed Army Institute of Research            *
0008  C      *            Department of Microwave Research                  *
0009  C      *            Walter Reed Army Medical Center                   *
0010  C      *            Washington, DC 20112                              *
0011  C      *                                                              *
0012  C      *            ++++++++++++++++++++++++++++++++++++++            *
0013  C      *                                                              *
0014  C      *       BY:  Technology USA, Inc.                              *
0015  C      *            P.O. Box 55333                                    *
0016  C      *            Fort Washington, Maryland 20744                   *
0017  C      *            Phone: (301) 292-2592                             *
0018  C      *                                                              *
0019  C      *  ----------------------------------------------------------  *
0020  C      *     Segment WR13C is the control segment of WR13.  It puts   *
0021  C      *  out a menu with the options:                                *
0022  C      *    1 - Enter the number of azimuth steps and step size.      *
0023  C      *    2 - Enter the number of rotation steps and step size.     *
0024  C      *    3 - Enter the microwave frequency.                        *
0025  C      *    4 - Set antennae to a new azimuth position.               *
0026  C      *    5 - Rotate antennae to a new angle.                       *
0027  C      *    6 - Enter number of readings to average for each point.   *
0028  C      *    7 - Request graphs on the CRT.                            *
0029  C      *   10 - List on printer.                                      *
0030  C      *    8 - Scan from the present position                        *
0031  C      *    9 - Terminate the program.                                *
0032  C      *  After 8 is chosen, the antennae are positioned at the       *
0033  C      *  present position-(number of data points-1)*step size/2.     *
0034  C      *  The amplitude and phase are each averaged over the number   *
0035  C      *  of readings specified in 6 and saved in the array DAT       *
0036  C      *  along with the position.  Then the antennae are advanced    *
0037  C      *  by step size and the amplitude and phase are read again.    *
0038  C      *  This is repeated for the specified number of steps per      *
0039  C      *  scan.                                                       *
0040  C      *  After each scan, the data accumulated in array DAT is       *
0041  C      *  read out to a disc file, SRS21A.  If there is a file        *
0042  C      *  with that name already, the last letter is incremented.     *
0043  C      *  After the data is read out, the angle is incremented by     *
0044  C      *  rotation step size and the whole process repeated for       *
0045  C      *  the number of rotation steps.                               *
0046  C      *                                                              *
0047  C      ****************************************************************
0048         PROGRAM WR13C,5
0049         DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0050        *          ISIZE(2),ITITL(40),IREG(2),IFAT(3120),PRNTL(2),
0051        *          PLUNIT(2),FAT(1560)
0052         INTEGER CRT,PRNT
0053         COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0054        *       IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IREND,PRESRO,IDCB,NAMEF,
0055        *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0056        *       PLUNIT,ITITL,PRNT,IGRLOC
0057         EQUIVALENCE (REG,IREG),(DAT,IFAT),(DAT,FAT)
0058  C
```

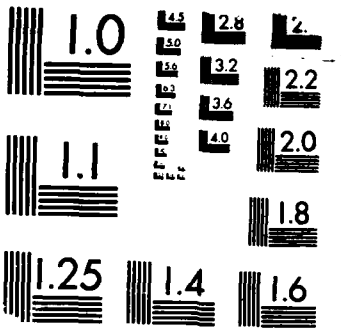
```
0059        COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,NONLY,
0060       *CM(4,112),IHEAD(40),IDATE(15)
0061        DATA LUAZ/31/,LURO/33/,I1/15446B/
0062  C-----------------------------------------------------------------------
0063  C  Set number of scans if plots requested.
0064  C-----------------------------------------------------------------------
0065        IF (PRESAZ .EQ. 999.9) GO TO 525
0066        IF (IGRLOC .EQ. 1) ILFLAG = 0
0067        IF (IDONE .GE. IREND) GO TO 515
0068        IF (IPEND .EQ. 1) GO TO 8701
0069        IF (IDONE .NE. 1) GO TO 511
0070        IF (IPEND .GT. IREND) GO TO 513
0071          ISEND = IPEND - 1
0072          GO TO 8701
0073    511 IF (IDONE+IPEND .GT. IREND) GO TO 513
0074          ISEND = IPEND
0075          GO TO 8701
0076    513   ISEND = IREND - IDONE
0077          IPFLAG = -1
0078          GO TO 8701
0079  C-----------------------------------------------------------------------
0080  C  Reset original position and print menu.
0081  C-----------------------------------------------------------------------
0082    515 WRITE (CRT, 519)
0083    519  FORMAT (/,1X,"SCAN IS FINISHED",/,1X,
0084       *        "ANTENNAE ARE BEING RESET TO THEIR ORIGINAL POSITION",
0085       *        /,1X,"PLEASE EXCUSE THE DELAY")
0086        CALL SETPO (CRT, LUAZ, PRESAZ, 2, IERR)
0087        IF (IERR .EQ. 0) GO TO 522
0088          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0089          GO TO 9090
0090    522  PRESRO = PRESRO - RSTEPS*(IREND-1)
0091        CALL SETPO (CRT, LURO, PRESRO, 3, IERR)
0092        IF (IERR .EQ. 0) GO TO 523
0093          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0094          GO TO 9090
0095    523 IF (IPFLAG .EQ. 0) GO TO 525
0096        ISEND = 1
0097        IPFLAG = 1
0098        ILFLAG = 1
0099    525  IDONE = 0
0100  C-----------------------------------------------------------------------
0101  C  Clear screen and print heading.
0102  C-----------------------------------------------------------------------
0103        WRITE(CRT,529)
0104  0529  FORMAT(""
0105       *       10X,55'*',/,
0106       *10X,"*",20X,"PROGRAM  WR13",20X,"*",/,
0107       *10X,"*",11X,"S21 LINE AND ANGLE SCAN PROGRAM",11X,"*",/,
0108       *10X,55'*',/)
0109    530  CALL WR1 (CRT, LUAZ, PRESAZ, IERR, 0)
0110        IF (IERR .EQ. 0) GO TO 540
0111          CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0112          GO TO 9090
0113    540  CALL WR3 (CRT,LURO,PRESRO,IERR,0)
0114        IF (IERR .EQ. 0) GO TO 550
0115          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0116          GO TO 9090
0117    550 IF (PRNT .EQ. 0) GO TO 555
0118          PRNTL(1) = 4H PRI
```

```
0119          PRNTL(2) = 4HNT
0120          GO TO 560
0121     555  PRNTL(1) = 4HNO P
0122          PRNTL(2) = 4HRINT
0123     560  WRITE(CRT,600) IAEND,ASTEPS,IREND,RSTEPS,RFREQ,PRESAZ,PRESRO,
0124         *IRNUM,IPEND,(PLUNIT(I),I=1,2),(PRNTL(I),I=1,2)
0125    0600 FORMAT(" PROGRAM PARAMETER ENTRY",30X,"PRESENT VALUES",/,
0126         *"   1 - Number of azimuth steps and step size.....",
0127         *I3," x",F6.2," mm",/,
0128         *"   2 - Number of rotation steps and step size.....",
0129         *I3," x",F6.2," degrees",/,
0130         *"   3 - Microwave frequency.....",
0131         *F7.0," MHz",/,
0132         *"   4 - Azimuth position.....",
0133         *F8.3," mm",/,
0134         *"   5 - Angle.....",
0135         *F8.3," degrees",/,
0136         *"   6 - Number of readings to average per point.....",I5,/,
0137         *"   7 - Number scans per graph.....",I5,1X,2A4,/,
0138         *"  10 - Toggle switch for listing on printer.....",2X,2A4,/,
0139         *" EXECUTION OPTIONS",/,
0140         *"   8 - Scan from the present position.",/,
0141         *"   9 - Terminate the program.",/,"")
0142     610 WRITE (CRT,619)
0143    0619 FORMAT ("")
0144     620 WRITE (CRT,629)
0145     629 FORMAT (1X,"SELECT OPTION NUMBER _")
0146         READ(CRT,*) IANS
0147         IF (IANS .EQ. 9999) GO TO 9090
0148         IF (IANS .EQ. 10) GO TO 700
0149         IF (IANS .EQ. 9) GO TO 9090
0150         IF (IANS .EQ. 8) GO TO 8000
0151         IF (IANS .EQ. 7) GO TO 7000
0152         IF (IANS .EQ. 6) GO TO 6000
0153         IF (IANS .EQ. 5) GO TO 5000
0154         IF (IANS .EQ. 4) GO TO 4000
0155         IF (IANS .EQ. 3) GO TO 3000
0156         IF (IANS .EQ. 2) GO TO 2000
0157         IF (IANS .EQ. 1) GO TO 1000
0158         WRITE (CRT,659)
0159     659 FORMAT (/,1X,"ERROR # WR13 - 15001 ......(WR13)",/,1X,
0160        *        "INCORRECT RESPONSE.  ENTER ANY NUMBER FROM 1 TO 10.")
0161         GO TO 620
0162    C-------------------------------------------------------------------
0163    C  Set to print on the printer.
0164    C-------------------------------------------------------------------
0165     700 IF (PRNT .EQ. 6) GO TO 750
0166           PRNT = 6
0167           PRNTL(1) = 4H PRI
0168           PRNTL(2) = 4HNT
0169           GO TO 760
0170     750   PRNT = 0
0171           PRNTL(1) = 4HNO P
0172           PRNTL(2) = 4HRINT
0173     760 WRITE (CRT,769) I1,(PRNTL(I),I=1,2)
0174     769 FORMAT (1A2, "a 54c 13Y",2A4)
0175         GO TO 610
0176    C-------------------------------------------
0177    C  Inquire from the user:  azimuth ste  size and  mb
0178    C-------------------------------------
```

AD-A192 590 ANALYSIS TECHNIQUES FOR MICROWAVE DOSIMETRIC DATA(U) 2/2
TECHNOLOGY-USA INC FORT WASHINGTON MD J R DEMOS ET AL.
OCT 85 DAMD17-79-C-9151

UNCLASSIFIED F/G 14/2 NL





```
0179  1000  WRITE(CRT,1100)
0180  1100  FORMAT(/," Enter the number of steps per scan.  _")
0181        READ(CRT,*) IAEND
0182        IF (IAEND .EQ. 9999) GO TO 9090
0183        IF ((IAEND .LT. 513) .AND. (IAEND .GT. 0)) GO TO 1190
0184          WRITE (CRT,1109)
0185   1109   FORMAT (/,1X,"ERROR # WR13 - 15202 ......(WR13)",/,
0186       *           1X,"THE NUMBER OF STEPS MUST BE FROM 1 - 512.",/,
0187       *           1X,"REENTER THE NUMBER OF STEPS.")
0188          GO TO 1000
0189  1190  WRITE(CRT,1200)
0190  1200  FORMAT(/," Enter the step size (mm).......  _")
0191        READ(CRT,*) ASTEPS
0192        IF (ASTEPS .EQ. 9999) GO TO 9090
0193        WRITE (CRT,1209) I1,IAEND,ASTEPS
0194   1209 FORMAT (1A2,"a 52c 6Y",I3," x",F6.2)
0195        GO TO 610
0196  C-------------------------------------------------------------------
0197  C  Inquire from user: rotation step size and number of steps.
0198  C-------------------------------------------------------------------
0199  2000  WRITE (CRT,2009)
0200  2009  FORMAT (/,1X,"Enter the number of rotation steps. _")
0201        READ (CRT,*) IREND
0202        IF (IREND .EQ. 9999) GO TO 9090
0203        IF (IREND .GT. 0) GO TO 2028
0204          WRITE (CRT,2019)
0205   2019   FORMAT (/,1X,"ERROR # WR13 - 15302 ......(WR13)",/,
0206       *             1X,"THE NUMBER OF STEPS MUST BE GREATER THAN 0.",/,
0207       *             1X,"REENTER THE NUMBER OF ROTATION STEPS.")
0208          GO TO 2000
0209   2028 WRITE (CRT,2029)
0210  2029  FORMAT (/,1X,"Enter the rotation step size. _")
0211        READ (CRT,*) RSTEPS
0212        IF (RSTEPS .EQ.9999) GO TO 9090
0213        WRITE (CRT,2039) I1, IREND, RSTEPS
0214   2039 FORMAT (1A2,"a 52c 7Y",I3," x",F6.2)
0215        GO TO 610
0216  C-------------------------------------------------------------------
0217  C  Inquire from the user:  microwave frequency.
0218  C-------------------------------------------------------------------
0219  3000  WRITE(CRT,3500)
0220  3500  FORMAT(/," Enter the RF frequency (MHz)...  _")
0221        READ(CRT,*)  RFREQ
0222        IF (RFREQ .EQ. 9999) GO TO 9090
0223        IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 3600
0224          WRITE (CRT,3509) TEMP1, TEMP2
0225  3509    FORMAT (/,1X,"ERROR # WR13 - 15004 ......(WR13)",/,1X,
0226       *           "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0227       *           /,1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0228       *           /,1X,"Do you wish to recalibrate?  (YES/NO) _")
0229          READ (CRT,3599) IANS
0230  3599    FORMAT (A2)
0231          IF (IANS .EQ. 2HYE) GO TO 9000
0232          GO TO 3000
0233   3600 WRITE (CRT, 3609) I1, RFREQ
0234   3609 FORMAT (1A2,"a 54c 8Y",F5.0)
0235        GO TO 610
0236  C-------------------------------------------------------------------
0237  C  Inquire new azimuth position and call WR6 to set it.
0238  C-------------------------------------------------------------------
```

```
0239  4000  WRITE (CRT,4090)
0240  4090  FORMAT (/,1X,"Enter new position (mm).  _")
0241        READ (CRT,*) PRESAZ
0242        IF (PRESAZ .EQ. 9999) GO TO 9090
0243        CALL SETPO (CRT,LUAZ,PRESAZ,2,IERR)
0244        IF (IERR .EQ. 0) GO TO 4400
0245          CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0246          GO TO 9090
0247   4400 WRITE (CRT,4409) I1,PRESAZ
0248   4409 FORMAT (1A2,"a 52c 9Y",F8.3)
0249        GO TO 610
0250  C-----------------------------------------------------------------------
0251  C  Inquire new rotation and call WR6 to set it.
0252  C-----------------------------------------------------------------------
0253  5000  WRITE (CRT,5090)
0254  5090  FORMAT (/,1X,"Enter new angle... _")
0255        READ (CRT,*) PRESRO
0256        IF (PRESRO .EQ. 9999) GO TO 9090
0257        CALL SETPO (CRT, LURO, PRESRO, 3, IERR)
0258        IF (IERR .EQ. 0) GO TO 5500
0259          CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0260          GO TO 9090
0261   5500 WRITE (CRT,5509) I1, PRESRO
0262   5509 FORMAT (1A2,"a 52c 10Y",F8.3)
0263        GO TO 610
0264  C-----------------------------------------------------------------------
0265  C  Inquire from the user: number of readings per data point.
0266  C-----------------------------------------------------------------------
0267  6000  WRITE (CRT,6009)
0268  6009  FORMAT (/,1X,
0269       *        "Enter number of readings to average per data point. _")
0270        READ (CRT,*) IRNUM
0271        IF (IRNUM .EQ. 9999) GO TO 9090
0272        IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0))  GO TO 6600
0273        WRITE (CRT,6509)
0274  6509  FORMAT (/,1X,"ERROR # WR13 - 15005 ......(WR13)",/,
0275       *         1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0276       *         1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0277        GO TO 6000
0278   6600 WRITE (CRT, 6609) I1, IRNUM
0279   6609 FORMAT (1A2,"a 52c 11Y",I5)
0280        GO TO 610
0281  C-----------------------------------------------------------------------
0282  C  Inquire from user:  number of scans per graph.
0283  C-----------------------------------------------------------------------
0284   7000 WRITE (CRT,7009)
0285   7009 FORMAT (/,1X,"Enter number of scans between graphs. _")
0286        READ (CRT,*) IPEND
0287        IF (IPEND .EQ. 9999) GO TO 9090
0288        IF (IPEND .GE. 0) GO TO 7500
0289          WRITE (CRT,7209)
0290   7209   FORMAT (/,1X,"ERROR # WR13 - 15003 ......(WR13)",/,
0291       *        1X,"NUMBER OF SCANS CAN NOT BE LESS THAN 0",/,
0292       *        1X,"REENTER NUMBER OF SCANS BETWEEN GRAPHS.")
0293          GO TO 7000
0294   7500 WRITE (CRT,7509)
0295   7509 FORMAT (/,1X,"Enter '1' to plot on CRT ",
0296       *             "or '0' to plot on plotter. _")
0297        READ (CRT,*) IGRLOC
0298        IPFLAG = 1
```

```
0299         PLUNIT(1) = 4H-PLO
0300         PLUNIT(2) = 4HTTER
0301         IF (IGRLOC .NE. 1) GO TO 7550
0302           PLUNIT(1) = 4H - C
0303           PLUNIT(2) = 4HRT
0304    7550 IF (IPEND .NE. 0) GO TO 7600
0305           IPFLAG = 0
0306           PLUNIT(1) = 4HGRAP
0307           PLUNIT(2) = 4HHS
0308    7600 ISEND = 1
0309         WRITE (CRT, 7609) I1, IPEND, (PLUNIT(I),I=1,2)
0310    7609 FORMAT (1A2,"a 52c 12Y",I5,1X,2A4)
0311         GO TO 610
0312    C-------------------------------------------------------------------
0313    C  Set antennae to first position and create disc data file.
0314    C-------------------------------------------------------------------
0315     8000 WRITE (CRT,8009) (ITITL(I),I=1,40)
0316     8009 FORMAT (/,1X,
0317         *"Enter title of file or press 'RETURN' key for following title.",
0318         */,40A2,/)
0319          REG = EXEC (1,401B,ITITL,-80)
0320          IF (IREG(2) .EQ. 0) GO TO 8100
0321          DO 8050 I = (IREG(2)+3)/2,40
0322     8050 ITITL(I) = 2H
0323          IF ((IREG(2)/2)*2 .EQ. IREG(2)) GO TO 8100
0324          ITITL(IREG(2)/2+1) = (ITITL(IREG(2)/2+1)/256)*256 + 32
0325     8100 POSITN = PRESAZ-ASTEPS*(IAEND-1)/2
0326          PARAM = POSITN
0327          CALL WR6(PARAM,IERR,2,0)
0328          IF (IERR .EQ.0) GO TO 8200
0329            CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0330            GO TO 620
0331     8200 CALL CALF2(3, MC, RFREQ)
0332          ISIZE(2) = IAEND*6 + 20
0333          IF (ISIZE(2) .LT. 128) ISIZE(2) = 128
0334          ISIZE(1) = (ISIZE(2) * (IREND + 1) + 127)/128
0335     8300 NAMEF(3) = NAMEF(3) + 1
0336          CALL CREAT (IDCB,IERR,NAMEF,ISIZE,2)
0337          IF (IERR .GE. 0) GO TO 8450
0338          IF (IERR .EQ. -2) GO TO 8300
0339          WRITE (CRT,8409) IERR
0340     8409 FORMAT (/,1X,"ERROR #",I3," OCCURED IN SUBROUTINE CREAT")
0341          GO TO 9090
0342     8450 IF (PRNT .EQ. 0) GO TO 8500
0343            WRITE (PRNT,8459) ITITL,NAMEF
0344     8459 FORMAT ("1",40A2,/,1X,"FILE = ",3A2)
0345          WRITE (PRNT,600) IAEND,ASTEPS,IREND,RSTEPS,RFREQ,PRESAZ,PRESRO,
0346         *                 IRNUM,IPEND,PLUNIT,PRNTL
0347     8500 WRITE (CRT,8509) NAMEF
0348     8509 FORMAT (/,1X,"NAME OF DATA FILE IS ",3A2)
0349          CALL FTIME(IFAT)
0350          DO 8550 I=1,40
0351     8550 IFAT(15+I) = ITITL(I)
0352          IFAT(56) = 2HRO
0353          IFAT(57) = 0
0354          IFAT(58) = IAEND
0355          FAT(30) = ASTEPS
0356          IFAT(61) = 0
0357          IFAT(62) = IREND
0358          FAT(32) = RSTEPS
```

```
0359          FAT(33) = RFREQ
0360          IFAT(67) = ISIZE(1)
0361          IFAT(68) = ISIZE(2)
0362          ILFLAG = 1
0363          CALL WRITF (IDCB, IERR, DAT)
0364          IF (IERR .EQ. 0) GO TO 8700
0365            WRITE (CRT,8609) IERR
0366   8609     FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0367            GO TO 9090
0368  C-----------------------------------------------------------------------
0369  C Rotation scan from PRESRO to PRESRO+RSTEPS*(IREND-1) or until graph needed.
0370  C-----------------------------------------------------------------------
0371   8700 IF (IPEND .EQ. 0) ISEND = IREND
0372          ID = 1
0373          IDRCT = 1
0374   8701 DO 8900 J=1,ISEND
0375          IF (J + IDONE .EQ. 1) GO TO 8720
0376            IDRCT = -IDRCT
0377            PRESRO = PRESRO + RSTEPS
0378            PARAM = PRESRO
0379            CALL WR6 (PARAM, IERR, 3, 0)
0380            IF (IERR .EQ. 0) GO TO 8720
0381              CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0382              GO TO 9090
0383   8720 CALL WR3 (CRT, LURO, TRURO, IERR, 0)
0384          IF (IERR .EQ. 0) GO TO 8725
0385            CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0386            GO TO 9090
0387  C-----------------------------------------------------------------------
0388  C  Azimuth scan from PRESAZ-ASTEPS*(IAEND-1)/2 to PRESAZ+ASTEPS*(IAEND-1)/2
0389  C-----------------------------------------------------------------------
0390   8725 DO 8800 I=1,IAEND
0391          IF (IFBRK(IERR)) 9090,8730
0392   8730 CALL WR1 (CRT, LUAZ, TRUAZ, IERR, 0)
0393          IF (IERR .EQ. 0) GO TO 8735
0394            CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0395            GO TO 9090
0396  C       CALL CALF2(2,1,F)
0397   8735 XAVE = 0.
0398          YAVE = 0.
0399          DO 8750 K=1,IRNUM
0400          CALL MESUR(RFREQ, X1, Y1, X, Y)
0401          CALL CORCT(MC, X1, Y1, X, Y)
0402          YAVE = YAVE + Y
0403   8750 XAVE = XAVE + X
0404          XAVE = XAVE / IRNUM
0405          YAVE = YAVE / IRNUM
0406          RLOSS =-10*ALOGT(XAVE*XAVE + YAVE*YAVE)
0407          PHASE = ATAN2(YAVE, XAVE) * 180./3.141593
0408          IF (ILFLAG .EQ.0) GO TO 8780
0409          WRITE (CRT,8779) I,TRUAZ,RLOSS,PHASE
0410   8779 FORMAT (1X,"STEP",I2," AZIMUTH =",F8.3,
0411         *          " RLOSS =",F9.4," PHASE =",F8.3)
0412   8780 DAT(1,ID) = TRUAZ
0413          DAT(2,ID) = RLOSS
0414          DAT(3,ID) = PHASE
0415          IF (I .GE. IAEND) GO TO 8800
0416          ID = ID + IDRCT
0417          POSITN = POSITN + IDRCT * ASTEPS
0418          PARAM = POSITN
```

```
0419         CALL WR6(PARAM,IERR,2,0)
0420         IF (IERR .EQ.0) GO TO 8800
0421           CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0422           GO TO 9090
0423    8800 CONTINUE
0424   C-------------------------------------------------------------------
0425   C  End of azimiuth scan loop.
0426   C-------------------------------------------------------------------
0427         DAT(1,IAEND+1) = TRURO
0428         DAT(2,IAEND+1) = RFREQ
0429         IF (PRNT .EQ. 0) GO TO 8850
0430           WRITE (PRNT,8829) TRURO, RFREQ
0431    8829 FORMAT (//,5X,"ROTATION =",F8.3,5X,"FREQUENCY =",F6.0)
0432         DO 8830 IE = 1, IAEND
0433    8830 WRITE (PRNT,8839) (DAT(I,IE),I=1,3)
0434    8839 FORMAT (1X,"AZIMUTH =",F8.3,5X,"RLOSS =",F8.3,5X,"PHASE =",F8.3)
0435    8850 CALL WRITF (IDCB,IERR,DAT)
0436         IF (IERR .EQ. 0) GO TO 8900
0437           WRITE (CRT,8859) IERR
0438    8859   FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0439           GO TO 9090
0440    8900 CONTINUE
0441   C-------------------------------------------------------------------
0442   C  End of rotation scan loop
0443   C-------------------------------------------------------------------
0444         IDONE = IDONE + ISEND
0445         IF (IPFLAG .LT. 1) GO TO 515
0446   C-------------------------------------------------------------------
0447   C  Call EXEC to overlay this segment with WR13G
0448   C-------------------------------------------------------------------
0449    8990 IF (IGRLOC .EQ. 1) GO TO 8995
0450           INAME(3) = 2HG
0451           GO TO 8998
0452    8995 INAME(3) = 2HT
0453    8998 CALL EXEC (ICODE,INAME)
0454    9000 WRITE (CRT,9009)
0455    9009 FORMAT (2/,1X,"Run program AGS02 for new calibration.")
0456    9090 WRITE (CRT,9099)
0457   09099 FORMAT (3/,10X,
0458        *"********** PROGRAM WR13 TERMINATED **********")
0459         CALL CLOSE (IDCB)
0460         END
0461   C-------------------------------------------------------------------
0462   C  Subroutine SETPO calls WR6 to set an azimuth or elevation position
0463   C  and then calls WR1 to check the position.  If it is within .002 it
0464   C  returns, if not it calls WR6 once again.
0465   C-------------------------------------------------------------------
0466         SUBROUTINE SETPO(CRT,LU,PRES,UNIT,IERR)
0467         DO 100 I = 1,2
0468           PARAM = PRES
0469           CALL WR6 (PARAM,IERR,UNIT,0)
0470           IF (IERR .NE. 0) RETURN
0471           IF (I .GT. 1) RETURN
0472           IF (LU .EQ. 33) GO TO 90
0473           CALL WR1 (CRT,LU,NEW,IERR,0)
0474           GO TO 91
0475      90   CALL WR3 (CRT,LU,NEW,IERR,0)
0476      91   IF (IERR .NE. 0) RETURN
0477           IF (ABS(NEW-PRES) .LT. .002) RETURN
0478    100 CONTINUE
```

```
0479          RETURN
0480          END
0481          END$
```

```
&WR13G T=00004 IS ON CR00002 USING 00084 BLKS R=0521

0001  FTN4,L
0002  C     ***************************************************************
0003  C     *                                                             *
0004  C     *           SEGMENT:  WR13G                                   *
0005  C     *                                                             *
0006  C     *           ++++++++++++++++++++++++++++++++++++++            *
0007  C     *     FOR:  Walter Reed Army Institute of Research            *
0008  C     *           Department of Microwave Research                  *
0009  C     *           Walter Reed Army Medical Center                   *
0010  C     *           Washington, DC 20112                              *
0011  C     *                                                             *
0012  C     *           ++++++++++++++++++++++++++++++++++++++            *
0013  C     *                                                             *
0014  C     *      BY:  Technology USA, Inc.                              *
0015  C     *           P.O. Box 55333                                    *
0016  C     *           Fort Washington, Maryland 20744                   *
0017  C     *           Phone: (301) 292-2592                             *
0018  C     *                                                             *
0019  C     *  -------------------------------------------------------    *
0020  C     *     Segment WR13G is the segment of WR13 that plots a       *
0021  C     *  graph on the plotter.  It is read in and control passed    *
0022  C     *  to it by an EXEC(8,WR13G) call from segment WR15C after    *
0023  C     *  a scan is finished.  WR13G then plots a graph on the       *
0024  C     *  plotter of the attenuation versus position for each        *
0025  C     *  frequency with a marker equal to the frequency number.     *
0026  C     *  When this segment is finished, it calls EXEC(8,WR13C) to   *
0027  C     *  read in WR13C and pass control to it.                      *
0028  C     *                                                             *
0029  C     ***************************************************************
0030        PROGRAM WR13G,5
0031  C
0032        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0033       *          ISIZE(2),ITITL(40),PLUNIT(2)
0034        INTEGER STATUS, ALPHLU,  GOUTLU, CRT, PRNT
0035        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0036       *       IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IREND,PRESRO,IDCB,NAMEF,
0037       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0038       *       PLUNIT,ITITL,PRNT,IGRLOC
0039        DATA ALPHLU, GOUTLU /1,19/
0040  C
0041  C  STATUS  -  Set to zero if no errors occur in a called routine
0042  C  ALPHLU  -  The LU of the alphanumeric device
0043  C  GOUTLU  -  The LU of the graphics output device
0044  C
0045  C*****************************************************************************
0046  C
0047  C-----------------------------------------------------------------------
0048  C  Initialize DGL system
0049  C-----------------------------------------------------------------------
0050        WRITE(CRT,520)
0051   0520 FORMAT("")
0052        CALL ZBEGN
0053  C-----------------------------------------------------------------------
0054  C  Enable all devices, exit if any errors
0055  C-----------------------------------------------------------------------
0056        CALL ENDEV (ALPHLU,GOUTLU,STATUS)
0057        IF (STATUS .NE. 0) GOTO 9990
0058  C-----------------------------------------------------------------------
```

```
0059  C  Find minimum and maximum values.
0060  C-------------------------------------------------------------------
0061        XMIN = DAT(1,1)
0062        XMAX = DAT(1,IAEND)
0063        YMIN = 100000.
0064        YMAX = -YMIN
0065        DO 5100 I=1, IAEND
0066        IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0067        IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)
0068   5100 CONTINUE
0069        IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0070        YMIN = INT (YMIN)
0071        GO TO 5400
0072   5300 YMIN = INT (YMIN - .999)
0073   5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0074        YMAX = INT (YMAX + .999)
0075        GO TO 5600
0076   5500 YMAX = INT (YMAX)
0077   5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0078        IF (ABS(XMIN) .NE. XMIN) GO TO 5700
0079        XMIN = INT (XMIN)
0080        GO TO 5800
0081   5700 XMIN = INT (XMIN - .999)
0082   5800 IF (ABS(XMAX) .NE. XMAX) GO TO 5900
0083        XMAX = INT (XMAX + .999)
0084        GO TO 5950
0085   5900 XMAX = INT (XMAX)
0086  C-------------------------------------------------------------------
0087  C  Perform the viewing transformation, exit if any errors
0088  C-------------------------------------------------------------------
0089   5950 CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0090        IF (STATUS .NE. 0) GOTO 9990
0091  C-------------------------------------------------------------------
0092  C  Draw axis and label, then plot.
0093  C-------------------------------------------------------------------
0094        CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
0095        GO TO 9000
0096  C-------------------------------------------------------------------
0097  C  Disable logical devices
0098  C-------------------------------------------------------------------
0099  C6000    CALL ZNEWF
0100  C        CALL CLEAR
0101   6000    CALL ZAEND
0102           CALL ZDEND
0103           CALL ZEND
0104  C-------------------------------------------------------------------
0105  C  Call EXEC to overlay this segment with WR13C and execute it.
0106  C-------------------------------------------------------------------
0107   9000 INAME(3) = 2HC
0108        CALL EXEC (ICODE, INAME)
0109   9990 CONTINUE
0110  C
0111        CALL ZAEND
0112        CALL ZDEND
0113  C-------------------------------------------------------------------
0114  C  Disable DGL system
0115  C-------------------------------------------------------------------
0116        CALL ZEND
0117  C-------------------------------------------------------------------
0118  C  Terminate program
```

```
0119  C-----------------------------------------------------------------
0120   9998 WRITE(CRT,9999)
0121   9999 FORMAT("")
0122        END
0123  C
0124  C*****************************************************************
0125  C                      ENDEV SUBROUTINE
0126  C
0127  C  PURPOSE:       This subroutine enables all logical devices used by
0128  C                  the program.
0129  C
0130  C  DESCRIPTION:   This subroutine enables the DGL work station.  The DGL
0131  C                  workstation contains alphanumeric and graphics output
0132  C                  devices.
0133  C
0134  C  CALLING SEQUENCE:  CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0135  C
0136  C  PARAMETERS:
0137  C                  ALPHLU:   [INTEGER]; Alphanumeric LU
0138  C                  GOUTLU:   [INTEGER]; Graphics output LU
0139  C                  STATUS:   [INTEGER]; Set to zero if no errors occur
0140  C                                       during initialization of the
0141  C                                       workstation.  It is set to the
0142  C                                       DGL error return value if an
0143  C                                       error is found.
0144  C
0145  C*****************************************************************
0146  C
0147        SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0148  C
0149        INTEGER ALPHLU, GOUTLU,  STATUS
0150        INTEGER CONTRL
0151  C-----------------------------------------------------------------
0152  C  If an error occurs, write out an error message, and return.
0153  C
0154  C  Enable alphanumeric device
0155  C-----------------------------------------------------------------
0156  C     CALL ZAINT (ALPHLU,STATUS)
0157  C     IF (STATUS .EQ. 0) GOTO 1000
0158  C       CALL ERRMS (ALPHLU,STATUS,6HZAINT )
0159  C1000 CONTINUE
0160  C-----------------------------------------------------------------
0161  C  Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0162  C-----------------------------------------------------------------
0163        CONTRL = 0
0164        CALL ZDINT (GOUTLU,CONTRL,STATUS)
0165          IF (STATUS .EQ. 0) GOTO 9999
0166          CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0167   9999 CONTINUE
0168  C-----------------------------------------------------------------
0169  C Return to main program after all devices are properly enabled
0170  C-----------------------------------------------------------------
0171        RETURN
0172        END
0173  C
0174  C*****************************************************************
0175  C
0176  C                        SUBROUTINE VIEWT
0177  C
0178  C  PURPOSE:        This subroutine performs the initial viewing
```

```
C                   transformation.
C
C  DESCRIPTION:     This subroutine performs the viewing transformation in
C                   the following steps:
C
C                    - Places the image on the largest possible area
C                    - Sets the window to the desired range.
C                    - Resets the viewport to leave room for labels
C                    - Recomputes character size based on specified window
C
C  CALLING SEQUENCE:  CALL VIEWT
C
C  PARAMETERS:     NONE
C
C*********************************************************************
C
      SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
C
      INTEGER IDUM, IERR
      REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
      REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
C
C  IDUM     -  Dummy var
C  IERR     -  Error return (not used)
C  AR       -  Holds aspect ratio
C  VIEW     -  Holds current viewport bounds
C  XSIZE    -  Temp work variable
C  YSIZE    -  Temp work variable
C  XCSIZ    -  Temp holder of character size X
C  XCSIZ    -  Temp holder of character size Y
C  WXMIN    -  Temp holder of window X - min
C  WXMAX    -  Temp holder of window X - max
C  WYMIN    -  Temp holder of window Y - min
C  WYMAX    -  Temp holder of window Y - max
C  MINX     -  Temp holder of new viewport X - min
C  MAXX     -  Temp holder of new viewport X - max
C  MINY     -  Temp holder of new viewport Y - min
C  MAXY     -  Temp holder of new viewport Y - max
C
C*********************************************************************
C
C  Inquire aspect ratio of logical display limits
C-------------------------------------------------------------------
      CALL ZIWS (254,0,2,IDUM,AR,IERR)
      IF (IERR .EQ. 0) GO TO 555
        CALL ERRMS (1,IERR,6HZIWS  )
        GO TO 9999
C-------------------------------------------------------------------
C  Make the largest possible area of the logical display available
C  for graphical output by setting the aspect ratio(AR).
C-------------------------------------------------------------------
  555 YSIZE = AR(2)
      XSIZE = 1.0
      CALL ZASPK (XSIZE,YSIZE)
C-------------------------------------------------------------------
C  Specify the desired range of X and Y values of the window
C-------------------------------------------------------------------
      CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
C-------------------------------------------------------------------
C  Inquire current viewport limits
```

```
0239  C-----------------------------------------------------------------------
0240        CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0241        IF (IERR .EQ. 0) GO TO 577
0242          CALL ERRMS (1,IERR,6HZIWS  )
0243          GO TO 9999
0244  C-----------------------------------------------------------------------
0245  C  Calculate the lower left hand corner of the viewport and leave
0246  C  enough room for labels.  The viewport is reduced 12% on each side
0247  C  to give room for lables.  Set the new viewport
0248  C-----------------------------------------------------------------------
0249    577 MINX = .12 * VIEW(2)
0250        MAXX = .88 * VIEW(2)
0251        MINY = .12 * VIEW(4)
0252        MAXY = .88 * VIEW(4)
0253        CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0254  C-----------------------------------------------------------------------
0255  C  Now set the character size based on the size of the window
0256  C  The constants below produce a readable character size in the new
0257  C  window.
0258  C-----------------------------------------------------------------------
0259        XCSIZ = .015 * (WXMAX - WXMIN)
0260        YCSIZ = .025 * (WYMAX - WYMIN)
0261        CALL ZCSIZ (XCSIZ,YCSIZ)
0262  C
0263   9999 RETURN
0264        END
0265  C*************************************************************************
0266  C                          SUBROUTINE DRWDT
0267  C
0268  C  PURPOSE:       This subroutine draws the current graph.
0269  C
0270  C  DESCRIPTION:   This subroutine clears the alphanumeric and graphics
0271  C                 displays.  It then draws the current graph.  Note
0272  C                 that if the user has not changed any data values
0273  C                 the default values will be used.
0274  C
0275  C  CALLING SEQUENCE:  CALL DRWDT
0276  C
0277  C  PARAMETERS:    NONE
0278  C
0279  C*************************************************************************
0280  C
0281        SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
0282        REAL DAT(3,520)
0283        DIMENSION ILIST(3),RLIST(2)
0284        INTEGER TEXT(12),OPCODE,RSIZE
0285  C
0286        REAL VIEW(4)
0287  C
0288  C  VIEW     -  Temp holder of viewport bounds
0289  C
0290  C*************************************************************************
0291  C
0292  C  Clear the graphics and alphanumeric displays
0293  C-----------------------------------------------------------------------
0294        CALL ZNEWF
0295        CALL CLEAR
0296  C-----------------------------------------------------------------------
0297  C  Determine parameters for LAXES call.  Search thru data for YMAX.
0298  C-----------------------------------------------------------------------
```

```
0299  C-----------------------------------------------------------------------
0300        XTIC = (XMAX-XMIN)/10.0
0301        YTIC = (YMAX-YMIN) / 10.0
0302        XORG = XMIN
0303        YORG = YMIN
0304        XMJC = 1.0
0305        YMJC = 1.0
0306        TSIZE = .02
0307        CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0308  C-----------------------------------------------------------------------
0309  C  Plot the graph.
0310  C-----------------------------------------------------------------------
0311        CALL ZMOVE(DAT(1,1),DAT(2,1))
0312        DO 5000 I=2, IAEND
0313        CALL ZDRAW(DAT(1,I),DAT(2,I))
0314   5000 CONTINUE
0315  C-----------------------------------------------------------------------
0316  C  Change the viewport to the maximum posible so text strings may be
0317  C  placed anywhere on the view surface.  Output the text strings, then
0318  C  reset the viewport.
0319  C-----------------------------------------------------------------------
0320    6000  CALL VPMAX (VIEW)
0321          TEXT(1) = 2HRe
0322          TEXT(2) = 2Hla
0323          TEXT(3) = 2Hti
0324          TEXT(4) = 2Hve
0325          TEXT(5) = 2H P
0326          TEXT(6) = 2Hos
0327          TEXT(7) = 2Hit
0328          TEXT(8) = 2Hio
0329          TEXT(9) = 2Hn
0330          TEXT(10) = 2H(m
0331          TEXT(11) = 2Hm)
0332          TEXT(12) = 6412B
0333          NMTEXT = 24
0334          XTEXT = XMIN + (XMAX - XMIN) * .3
0335          YTEXT = YMIN + (YMAX-YMIN)/21.0
0336  C
0337          CALL ZMOVE (XTEXT,YTEXT)
0338  C       OPCODE=1052
0339  C       ISIZE=1
0340  C       RSIZE=0
0341  C       ILIST(1)=6
0342  C       CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0343  C       IF (IERR .EQ. 0) GO TO 6010
0344  C         CALL ERRMS (1,IERR,6HZOESC )
0345    6010  CALL ZTEXT (NMTEXT,TEXT)
0346  C
0347  C       CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0348  C       IF (IERR .EQ. 0) GO TO 6020
0349  C         CALL ERRMS (1,IERR,6HZIESC )
0350  C         GO TO 9999
0351    6020  TEXT(1) = 2HAt
0352          TEXT(2) = 2Hte
0353          TEXT(3) = 2Hnu
0354          TEXT(4) = 2Hat
0355          TEXT(5) = 2Hio
0356          TEXT(6) = 2Hn
0357          TEXT(7) = 2H(d
0358          TEXT(8) = 2Hb)
```

```
0359          TEXT(9) = 6412B
0360          NMTEXT = 18
0361          XTEXT = XMIN + (XMAX -XMIN)/30.0
0362          YTEXT = YMIN + (YMAX-YMIN) * .3
0363          OPCODE = 250
0364          RLIST(1) = 0
0365          RLIST(2) = 1.
0366          ISIZE = 0
0367          RSIZE = 2
0368          CALL ZMOVE(XTEXT,YTEXT)
0369          CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0370          IF (IERR .EQ. 0) GO TO 6030
0371            CALL ERRMS (1,IERR,6HZOESC )
0372            GO TO 9999
0373    6030  CALL ZTEXT(NMTEXT,TEXT)
0374          OPCODE=250
0375          RLIST(1) = 1.
0376          RLIST(2) = 0
0377          ISIZE = 0
0378          RSIZE = 2
0379          CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0380          IF (IERR .EQ. 0) GO TO 6040
0381            CALL ERRMS (1,IERR,6HZOESC )
0382            GO TO 9999
0383    C
0384     6040 CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0385          CALL ZMCUR
0386    C
0387     9999 RETURN
0388          END
0389    C
0390    C*************************************************************************
0391    C                              SUBROUTINE ERRMS
0392    C
0393    C  PURPOSE:       To write out an error message.
0394    C
0395    C  DESCRIPTION:   This subroutine writes an error message to the alphanumeric
0396    C                 LU.  The error number and DGL subroutine name that the error
0397    C                 occured during is reported.
0398    C
0399    C  CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0400    C
0401    C  PARAMETERS:
0402    C                 ALPHLU:    [INTEGER];  The alphanumeric LU
0403    C
0404    C                 ERROR:     [INTEGER];  The error number of the error to
0405    C                                        reported
0406    C
0407    C                 SUBR:      [INTEGER];  An array containing the name of
0408    C                                        the subroutine where the error occured.
0409    C
0410    C*************************************************************************
0411    C
0412          SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0413          INTEGER ALPHLU,ERROR,SUBR(3)
0414    C
0415    C  Write out the error message
0416    C
0417          CALL ZMCUR
0418          WRITE(ALPHLU,100) ERROR, SUBR
```

```
  100 FORMAT(" Error ",I2," occured in subroutine ",3A2)
C
      RETURN
      END
C
C*************************************************************************
C                    SUBROUTINE CLEAR
C
C  PURPOSE:       To clear the alphanumeric display
C
C  DESCRIPTION:   This subroutine will clear the alphanumeric display
C                 of a HP 2647 or HP 2648 terminal.  If the display is
C                 not a HP 2647 or HP 2648 then the call has no effect.
C
C  CALLING SEQUENCE: CALL CLEAR
C
C  PARAMETERS:        NONE
C
C*************************************************************************
C
      SUBROUTINE CLEAR
      INTEGER ILIST(7), STRING(2), IERR
      REAL DUMMY
C
C  ILIST  - Information list returned by ZIWS
C  IERR   - Error information returned by ZIWS (not used here)
C  DUMMY  - Real information returned by ZIWS (none in this case)
C  STRING - Device-dependent commands that clear a 264X terminal
C
      DATA STRING /15550B,              15512B/
C                  /   \                /   \
C              33B   +  150B          33B  +  112B
C              esc       h            esc      J
C              (home cursor)         (clear display)
C
C*************************************************************************
C
C  Inquire the status of the alphanumeric device:
C  upon return, ILIST(4) = -1  ==> no alpha device,
C                        =  0  ==> it is disabled,
C                        =  1  ==> it is enabled.
C  If it is not enabled, just return.
C
      CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
      IF (IERR .EQ. 0) GO TO 7070
        CALL ERRMS (1,IERR,6HZIWS  )
        GO TO 9999
 7070 IF (ILIST(4) .NE. 1) GOTO 9999
C
C  Alpha device is enabled. Make sure it is '264X' type then clear.
C
      IF (ILIST(1) .NE. 2H26) GOTO 9999
      IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
      CALL ZALPH (4,STRING)
C
 9999 RETURN
      END
C
C*************************************************************************
C
```

```
0479  C                              SUBROUTINE VPMAX
0480  C
0481  C  PURPOSE:        Set the viewport to the maximum limits.
0482  C
0483  C  DESCRIPTION:    The current viewport is saved in VIEW.  The viewport
0484  C                  is then set to the maximum limits.
0485  C
0486  C  CALLING SEQUENCE:  CALL VPMAX (VIEW)
0487  C
0488  C  PARAMETERS:
0489  C                  VIEW:  [REAL ARRAY OF 4];  This array contains the
0490  C                                             viewport before it was
0491  C                                             maximized.
0492  C
0493  C*****************************************************************************
0494  C
0495        SUBROUTINE VPMAX (VIEW)
0496        REAL VIEW(4)
0497  C
0498        INTEGER IDUM
0499        REAL AR(2), NEWX, NEWY
0500  C
0501  C  IDUM    - Dummy work variable
0502  C  AR      - Temp holder of the aspect ratio
0503  C  NEWX    - Temp work variable
0504  C  NEWY    - Temp work variable
0505  C
0506  C*****************************************************************************
0507  C
0508  C  Inquire current viewport and save it in array VIEW
0509  C
0510        CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0511        IF (IERR .EQ. 0) GO TO 8080
0512          CALL ERRMS (1,IERR,6HZIWS  )
0513          GO TO 9999
0514  C
0515  C  Inquire the maximum aspect ratio
0516  C
0517   8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0518  C
0519  C  Set viewport to maximum dimensions
0520  C
0521        NEWY = 1.
0522        NEWX = 1.
0523        IF (AR(2) .LE. 1.) NEWY = AR(2)
0524        IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0525        CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0526  C
0527   9999 RETURN
0528        END
0529        END$
```

```
&WR13T T=00004 IS ON CR00002 USING 00084 BLKS R=0522

0001  FTN4,L
0002  C      ****************************************************************
0003  C      *                                                              *
0004  C      *            SEGMENT:  WR13T                                   *
0005  C      *                                                              *
0006  C      *            ++++++++++++++++++++++++++++++++++++++            *
0007  C      *      FOR:  Walter Reed Army Institute of Research            *
0008  C      *            Department of Microwave Research                  *
0009  C      *            Walter Reed Army Medical Center                   *
0010  C      *            Washington, DC 20112                              *
0011  C      *                                                              *
0012  C      *            ++++++++++++++++++++++++++++++++++++++            *
0013  C      *                                                              *
0014  C      *       BY:  Technology USA, Inc.                              *
0015  C      *            P.O. Box 55333                                    *
0016  C      *            Fort Washington, Maryland 20744                   *
0017  C      *            Phone: (301) 292-2592                             *
0018  C      *                                                              *
0019  C      *  ------------------------------------------------------      *
0020  C      *     Segment WR13T is the segment of WR15 that plots a        *
0021  C      *  graph on the terminal.  It is read in and control passed    *
0022  C      *  to it by an EXEC(8,WR13T) call from segment WR13C after     *
0023  C      *  a scan is finished.  WR13T then displays a graph on the     *
0024  C      *  CRT of the attenuation versus position of the scan.         *
0025  C      *  When this segment finishes, this graph is still displayed   *
0026  C      *  while the next scan is done and is not erased until just    *
0027  C      *  before the next graph is plotted.  The last graph is        *
0028  C      *  displayed while the antennae are repositioned and then      *
0029  C      *  WR13C turns the graphic display off without erasing it.     *
0030  C      *  The user can reenable the display by pressing the "SHIFT"   *
0031  C      *  and "G CURSOR" keys.  When this segment is finished, it     *
0032  C      *  calls EXEC(8,WR13C) to read in WR13C and pass control to    *
0033  C      *  it.                                                         *
0034  C      ****************************************************************
0035        PROGRAM WR13T,5
0036  C
0037        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0038       *          ISIZE(2),ITITL(40)
0039        INTEGER STATUS, ALPHLU, GOUTLU, CRT, PRNT
0040        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0041       *       IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IREND,PRESRO,IDCB,NAMEF,
0042       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0043       *       PLUNIT,ITITL,PRNT,IGRLOC
0044        EQUIVALENCE (GOUTLU,CRT),(ALPHLU,CRT)
0045  C
0046  C  STATUS  -  Set to zero if no errors occur in a called routine
0047  C  ALPHLU  -  The LU of the alphanumeric device
0048  C  GOUTLU  -  The LU of the graphics output device
0049  C
0050  C*****************************************************************************
0051  C
0052  C-----------------------------------------------------------------------
0053  C  Initialize DGL system
0054  C-----------------------------------------------------------------------
0055        WRITE(CRT,520)
0056   0520 FORMAT("")
0057        CALL ZBEGN
0058  C-----------------------------------------------------------------------
```

```
0059  C  Enable all devices, exit if any errors
0060  C-------------------------------------------------------------------
0061        CALL ENDEV (ALPHLU,GOUTLU,STATUS)
0062        IF (STATUS .NE. 0) GOTO 9990
0063        IF (IPFLAG .EQ. -1 ) GO TO 6000
0064  C-------------------------------------------------------------------
0065  C  Find minimum and maximum values.
0066  C-------------------------------------------------------------------
0067        XMIN = DAT(1,1)
0068        XMAX = DAT(1,IAEND)
0069        YMIN = 100000.
0070        YMAX = -YMIN
0071        DO 5100 I=1,IAEND
0072        IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0073        IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)
0074   5100 CONTINUE
0075        IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0076        YMIN = INT (YMIN)
0077        GO TO 5400
0078   5300 YMIN = INT (YMIN - .999)
0079   5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0080        YMAX = INT (YMAX + .999)
0081        GO TO 5600
0082   5500 YMAX = INT (YMAX)
0083   5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0084        IF (ABS(XMIN) .NE. XMIN) GO TO 5700
0085         XMIN = INT (XMIN)
0086        GO TO 5800
0087   5700 XMIN = INT (XMIN - .999)
0088   5800 IF (ABS(XMAX) .NE. XMAX) GO TO 5900
0089        XMAX = INT (XMAX + .999)
0090        GO TO 5950
0091   5900 XMAX = INT (XMAX)
0092  C-------------------------------------------------------------------
0093  C  Perform the viewing transformation, exit if any errors
0094  C-------------------------------------------------------------------
0095   5950 CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0096        IF (STATUS .NE. 0) GOTO 9990
0097  C-------------------------------------------------------------------
0098  C  Draw axis and label, then plot.
0099  C-------------------------------------------------------------------
0100        CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
0101        GO TO 9000
0102  C-------------------------------------------------------------------
0103  C  Disable logical devices
0104  C-------------------------------------------------------------------
0105  C6000    CALL ZNEWF
0106  C        CALL CLEAR
0107   6000    CALL ZAEND
0108           CALL ZDEND
0109           CALL ZEND
0110  C-------------------------------------------------------------------
0111  C  Call EXEC to overlay this segment with WR13C and execute it.
0112  C-------------------------------------------------------------------
0113   9000 INAME(3) = 2HC
0114        CALL EXEC (ICODE, INAME)
0115   9990 CONTINUE
0116  C
0117        CALL ZAEND
0118        CALL ZDEND
```

```
0119  C-----------------------------------------------------------------
0120  C  Disable DGL system
0121  C-----------------------------------------------------------------
0122        CALL ZEND
0123  C-----------------------------------------------------------------
0124  C  Terminate program
0125  C-----------------------------------------------------------------
0126   9998 WRITE(CRT,9999)
0127   9999 FORMAT("")
0128        END
0129  C
0130  C*****************************************************************************
0131  C                        ENDEV SUBROUTINE
0132  C
0133  C  PURPOSE:       This subroutine enables all logical devices used by
0134  C                 the program.
0135  C
0136  C  DESCRIPTION:   This subroutine enables the DGL work station.  The DGL
0137  C                 workstation contains alphanumeric and graphics output
0138  C                 devices.
0139  C
0140  C  CALLING SEQUENCE:  CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0141  C
0142  C  PARAMETERS:
0143  C                 ALPHLU:  [INTEGER]; Alphanumeric LU
0144  C                 GOUTLU:  [INTEGER]; Graphics output LU
0145  C                 STATUS:  [INTEGER]; Set to zero if no errors occur
0146  C                                     during initialization of the
0147  C                                     workstation.  It is set to the
0148  C                                     DGL error return value if an
0149  C                                     error is found.
0150  C
0151  C*****************************************************************************
0152  C
0153        SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0154  C
0155        INTEGER ALPHLU, GOUTLU,  STATUS
0156        INTEGER CONTRL
0157  C-----------------------------------------------------------------
0158  C  If an error occurs, write out an error message, and return.
0159  C
0160  C  Enable alphanumeric device
0161  C-----------------------------------------------------------------
0162        CALL ZAINT (ALPHLU,STATUS)
0163        IF (STATUS .EQ. 0) GOTO 1000
0164          CALL ERRMS (ALPHLU,STATUS,6HZAINT )
0165   1000 CONTINUE
0166  C-----------------------------------------------------------------
0167  C  Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0168  C-----------------------------------------------------------------
0169        CONTRL = 0
0170        CALL ZDINT (GOUTLU,CONTRL,STATUS)
0171          IF (STATUS .EQ. 0) GOTO 9999
0172          CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0173   9999 CONTINUE
0174  C-----------------------------------------------------------------
0175  C Return to main program after all devices are properly enabled
0176  C-----------------------------------------------------------------
0177        RETURN
0178        END
```

```
0179  C
0180  C*************************************************************************
0181  C
0182  C                          SUBROUTINE VIEWT
0183  C
0184  C  PURPOSE:        This subroutine performs the initial viewing
0185  C                  transformation.
0186  C
0187  C  DESCRIPTION:    This subroutine performs the viewing transformation in
0188  C                  the following steps:
0189  C
0190  C                   - Places the image on the largest possible area
0191  C                   - Sets the window to the desired range.
0192  C                   - Resets the viewport to leave room for labels
0193  C                   - Recomputes character size based on specified window
0194  C
0195  C  CALLING SEQUENCE:  CALL VIEWT
0196  C
0197  C  PARAMETERS:     NONE
0198  C
0199  C*************************************************************************
0200  C
0201        SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0202  C
0203        INTEGER IDUM, IERR
0204        REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0205        REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0206  C
0207  C  IDUM     -  Dummy var
0208  C  IERR     -  Error return (not used)
0209  C  AR       -  Holds aspect ratio
0210  C  VIEW     -  Holds current viewport bounds
0211  C  XSIZE    -  Temp work variable
0212  C  YSIZE    -  Temp work variable
0213  C  XCSIZ    -  Temp holder of character size X
0214  C  XCSIZ    -  Temp holder of character size Y
0215  C  WXMIN    -  Temp holder of window X - min
0216  C  WXMAX    -  Temp holder of window X - max
0217  C  WYMIN    -  Temp holder of window Y - min
0218  C  WYMAX    -  Temp holder of window Y - max
0219  C  MINX     -  Temp holder of new viewport X - min
0220  C  MAXX     -  Temp holder of new viewport X - max
0221  C  MINY     -  Temp holder of new viewport Y - min
0222  C  MAXY     -  Temp holder of new viewport Y - max
0223  C
0224  C*************************************************************************
0225  C
0226  C  Inquire aspect ratio of logical display limits
0227  C-------------------------------------------------------------------------
0228        CALL ZIWS (254,0,2,IDUM,AR,IERR)
0229        IF (IERR .EQ. 0) GO TO 555
0230          CALL ERRMS (1,IERR,6HZIWS  )
0231          GO TO 9999
0232  C-------------------------------------------------------------------------
0233  C  Make the largest possible area of the logical display available
0234  C  for graphical output by setting the aspect ratio(AR).
0235  C-------------------------------------------------------------------------
0236    555 YSIZE = AR(2)
0237        XSIZE = 1.0
0238        CALL ZASPK (XSIZE,YSIZE)
```

```
C-----------------------------------------------------------------
C  Specify the desired range of X and Y values of the window
C-----------------------------------------------------------------
      CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
C-----------------------------------------------------------------
C  Inquire current viewport limits
C-----------------------------------------------------------------
      CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
      IF (IERR .EQ. 0) GO TO 577
        CALL ERRMS (1,IERR,6HZIWS  )
        GO TO 9999
C-----------------------------------------------------------------
C  Calculate the lower left hand corner of the viewport and leave
C  enough room for labels.  The viewport is reduced 12% on each side
C  to give room for lables.  Set the new viewport
C-----------------------------------------------------------------
  577 MINX = .12 * VIEW(2)
      MAXX = .88 * VIEW(2)
      MINY = .12 * VIEW(4)
      MAXY = .88 * VIEW(4)
      CALL ZVIEW (MINX,MAXX,MINY,MAXY)
C-----------------------------------------------------------------
C  Now set the character size based on the size of the window
C  The constants below produce a readable character size in the new
C  window.
C-----------------------------------------------------------------
      XCSIZ = .015 * (WXMAX - WXMIN)
      YCSIZ = .025 * (WYMAX - WYMIN)
      CALL ZCSIZ (XCSIZ,YCSIZ)
C
 9999 RETURN
      END
C*******************************************************************************
C                          SUBROUTINE DRWDT
C
C  PURPOSE:       This subroutine draws the current graph.
C
C  DESCRIPTION:   This subroutine clears the alphanumeric and graphics
C                 displays.  It then draws the current graph.  Note
C                 that if the user has not changed any data values
C                 the default values will be used.
C
C  CALLING SEQUENCE:  CALL DRWDT
C
C  PARAMETERS:    NONE
C
C*******************************************************************************
C
      SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
      REAL DAT(3,520)
      DIMENSION ILIST(3)
      INTEGER TEXT(12),OPCODE,RSIZE
C
      REAL VIEW(4)
C
C  VIEW    -  Temp holder of viewport bounds
C
C*******************************************************************************
C
C  Clear the graphics and alphanumeric displays
```

```
0299  C-----------------------------------------------------------------------
0300        CALL ZNEWF
0301        CALL CLEAR
0302  C-----------------------------------------------------------------------
0303  C  Determine parameters for LAXES call.  Search thru data for YMAX.
0304  C-----------------------------------------------------------------------
0305  C-----------------------------------------------------------------------
0306        XTIC = (XMAX-XMIN)/10.0
0307        YTIC = (YMAX-YMIN) / 10.0
0308        XORG = XMIN
0309        YORG = YMIN
0310        XMJC = 1.0
0311        YMJC = 1.0
0312        TSIZE = .02
0313        CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0314  C-----------------------------------------------------------------------
0315  C  Plot the graph.
0316  C-----------------------------------------------------------------------
0317        CALL ZMOVE(DAT(1,1),DAT(2,1))
0318        DO 5000 I=2,IAEND
0319        CALL ZDRAW(DAT(1,I),DAT(2,I))
0320   5000 CONTINUE
0321  C-----------------------------------------------------------------------
0322  C  Change the viewport to the maximum posible so text strings may be
0323  C  placed anywhere on the view surface.  Output the text strings, then
0324  C  reset the viewport.
0325  C-----------------------------------------------------------------------
0326   6000  CALL VPMAX (VIEW)
0327         TEXT(1) = 2HRe
0328         TEXT(2) = 2Hla
0329         TEXT(3) = 2Hti
0330         TEXT(4) = 2Hve
0331         TEXT(5) = 2H P
0332         TEXT(6) = 2Hos
0333         TEXT(7) = 2Hit
0334         TEXT(8) = 2Hio
0335         TEXT(9) = 2Hn
0336         TEXT(10) = 2H(M
0337         TEXT(11) = 2HM)
0338         TEXT(12) = 6412B
0339         NMTEXT = 24
0340         XTEXT = 0.0
0341         YTEXT = YMIN + (YMAX-YMIN)/21.0
0342  C
0343         CALL ZMOVE (XTEXT,YTEXT)
0344         OPCODE=1052
0345         ISIZE=1
0346         RSIZE=0
0347         ILIST(1)=6
0348         CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0349         IF (IERR .EQ. 0) GO TO 6010
0350           CALL ERRMS (1,IERR,6HZOESC )
0351   6010  CALL ZTEXT (NMTEXT,TEXT)
0352  C
0353  C      CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0354  C      IF (IERR .EQ. 0) GO TO 6020
0355  C        CALL ERRMS (1,IERR,6HZIESC )
0356  C        GO TO 9999
0357   6020  TEXT(1) = 2HAt
0358         TEXT(2) = 2Hte
```

```
0359          TEXT(3) = 2Hnu
0360          TEXT(4) = 2Hat
0361          TEXT(5) = 2Hie
0362          TEXT(6) = 2Hn
0363          TEXT(7) = 2H(d
0364          TEXT(8) = 2Hb)
0365          TEXT(9) = 6412B
0366          NMTEXT = 18
0367          XTEXT = XMIN + (XMAX -XMIN)/30.0
0368          YTEXT = YMIN + (YMAX-YMIN)/2.0
0369          OPCODE = 1050
0370          ILIST(1) = 1
0371          ISIZE = 1
0372          RSIZE = 0
0373          CALL ZMOVE(XTEXT,YTEXT)
0374          CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0375          IF (IERR .EQ. 0) GO TO 6030
0376            CALL ERRMS (1,IERR,6HZOESC )
0377            GO TO 9999
0378   6030   CALL ZTEXT(NMTEXT,TEXT)
0379          OPCODE=1050
0380          ILIST(1) = 0
0381          ISIZE = 1
0382          RSIZE = 0
0383          CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0384          IF (IERR .EQ. 0) GO TO 6040
0385            CALL ERRMS (1,IERR,6HZOESC )
0386            GO TO 9999
0387   C
0388    6040  CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0389          CALL ZMCUR
0390   C
0391    9999  RETURN
0392          END
0393   C
0394   C*************************************************************************
0395   C                              SUBROUTINE ERRMS
0396   C
0397   C  PURPOSE:       To write out an error message.
0398   C
0399   C  DESCRIPTION:   This subroutine writes an error message to the alphanumeric
0400   C                 LU.  The error number and DGL subroutine name that the error
0401   C                 occured during is reported.
0402   C
0403   C  CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0404   C
0405   C  PARAMETERS:
0406   C                 ALPHLU:    [INTEGER];  The alphanumeric LU
0407   C
0408   C                 ERROR:     [INTEGER];  The error number of the error to
0409   C                                        reported
0410   C
0411   C                 SUBR:      [INTEGER];  An array containing the name of
0412   C                                        the subroutine where the error occured
0413   C
0414   C*************************************************************************
0415   C
0416         SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0417         INTEGER ALPHLU,ERROR,SUBR(3)
0418   C
```

```
C  Write out the error message
C
      CALL ZMCUR
      WRITE(ALPHLU,100) ERROR, SUBR
  100 FORMAT(" Error ",I2," occured in subroutine ",3A2)
C
      RETURN
      END
C
C*******************************************************************************
C                    SUBROUTINE CLEAR
C
C  PURPOSE:       To clear the alphanumeric display
C
C  DESCRIPTION:   This subroutine will clear the alphanumeric display
C                 of a HP 2647 or HP 2648 terminal.  If the display is
C                 not a HP 2647 or HP 2648 then the call has no effect.
C
C  CALLING SEQUENCE: CALL CLEAR
C
C  PARAMETERS:        NONE
C
C*******************************************************************************
C
      SUBROUTINE CLEAR
      INTEGER ILIST(7), STRING(2), IERR
      REAL DUMMY
C
C  ILIST  - Information list returned by ZIWS
C  IERR   - Error information returned by ZIWS (not used here)
C  DUMMY  - Real information returned by ZIWS (none in this case)
C  STRING - Device-dependent commands that clear a 264X terminal
C
      DATA STRING /15550B,                15512B/
C                  /    \                /    \
C              33B   +  150B          33B  +  112B
C              esc        h           esc       J
C              (home cursor)         (clear display)
C
C*******************************************************************************
C
C  Inquire the status of the alphanumeric device:
C  upon return, ILIST(4) = -1  ==> no alpha device,
C                        =  0  ==> it is disabled,
C                        =  1  ==> it is enabled.
C  If it is not enabled, just return.
C
      CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
      IF (IERR .EQ. 0) GO TO 7070
        CALL ERRMS (1,IERR,6HZIWS  )
        GO TO 9999
 7070 IF (ILIST(4) .NE. 1) GOTO 9999
C
C  Alpha device is enabled. Make sure it is '264X' type then clear.
C
      IF (ILIST(1) .NE. 2H26) GOTO 9999
      IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
      CALL ZALPH (4,STRING)
C
 9999 RETURN
```

```
0479        END
0480  C
0481  C*************************************************************************
0482  C
0483  C                              SUBROUTINE VPMAX
0484  C
0485  C  PURPOSE:        Set the viewport to the maximum limits.
0486  C
0487  C  DESCRIPTION:    The current viewport is saved in VIEW.  The viewport
0488  C                  is then set to the maximum limits.
0489  C
0490  C  CALLING SEQUENCE:  CALL VPMAX (VIEW)
0491  C
0492  C  PARAMETERS:
0493  C                  VIEW:  (REAL ARRAY OF 4);  This array contains the
0494  C                                             viewport before it was
0495  C                                             maxumized.
0496  C
0497  C*************************************************************************
0498  C
0499        SUBROUTINE VPMAX (VIEW)
0500        REAL VIEW(4)
0501  C
0502        INTEGER IDUM
0503        REAL AR(2), NEWX, NEWY
0504  C
0505  C  IDUM    - Dummy work variable
0506  C  AR      - Temp holder of the aspect ratio
0507  C  NEWX    - Temp work variable
0508  C  NEWY    - Temp work variable
0509  C
0510  C*************************************************************************
0511  C
0512  C  Inquire current viewport and save it in array VIEW
0513  C
0514        CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0515        IF (IERR .EQ. 0) GO TO 8080
0516          CALL ERRMS (1,IERR,6HZIWS  )
0517          GO TO 9999
0518  C
0519  C  Inquire the maximum aspect ratio
0520  C
0521   8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0522  C
0523  C  Set viewport to maximum dimensions
0524  C
0525        NEWY = 1.
0526        NEWX = 1.
0527        IF (AR(2) .LE. 1.) NEWY = AR(2)
0528        IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0529        CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0530  C
0531   9999 RETURN
0532        END
0533        END$
```

```
&WR14  T=00004 IS ON CR32767 USING 00104 BLKS R=0657

0001  FTN4,L
0002  C      ****************************************************************
0003  C      *                                                              *
0004  C      *            PROGRAM:  WR14                                    *
0005  C      *                                                              *
0006  C      *            ++++++++++++++++++++++++++++++++++++              *
0007  C      *       FOR: Walter Reed Army Institute of Research            *
0008  C      *            Department of Microwave Research                  *
0009  C      *            Walter Reed Army Medical Center                   *
0010  C      *            Washington, DC 20112                              *
0011  C      *                                                              *
0012  C      *            ++++++++++++++++++++++++++++++++++++              *
0013  C      *                                                              *
0014  C      *        BY: Technology USA, Inc.                              *
0015  C      *            P.O. Box 55333                                    *
0016  C      *            Fort Washington, Maryland 20744                   *
0017  C      *            Phone: (301) 292-2592                             *
0018  C      *                                                              *
0019  C      *  ------------------------------------------------------      *
0020  C      *     Program WR14 is designed to read a file of attenuation   *
0021  C      *  readings created by program WR13, WR15, WR16, or WR17.      *
0022  C      *  It lists the readings on the printer and plots them on      *
0023  C      *  the CRT or plotter and writes them out to tape.             *
0024  C      *                                                              *
0025  C      ****************************************************************
0026        PROGRAM WR14
0027        DIMENSION DAT(3,520),NAMEF(3),NAMES(3),IDCB(144),IDATIM(15),
0028       *          ITITL(40),IFAT(3120),IVNAM(5),FAT(1560),TYPEF(2)
0029        INTEGER ALPHLU,GOUTLU,CRT,PRNT,TAPE
0030        LOGICAL UP
0031        EQUIVALENCE (DAT,IFAT),(ALPHLU,CRT),(DAT,FAT)
0032        DATA CRT,GOUTLU,PRNT,TAPE/1,1,6,8/,
0033       *     PRINT,PLCRT,PLPLT,STAPE/4*4HYES /,I1/15446B/,
0034       *     NF/0/,TYPEF/4HTAPE,4HDISC/
0035  C-------------------------------------------------------------------------
0036  C  Clear screen and print heading.
0037  C-------------------------------------------------------------------------
0038        IWAIT = 0
0039        CALL CHCK1 (CRT, TAPE, IWAIT, 0, 1)
0040        IF (IWAIT .EQ. 0)  GO TO 10
0041          STAPE = 4HNO
0042  C     CALL LPSTS (PRNT, UP)
0043  C     IF (UP .EQ. .TRUE.) GO TO 10
0044  C       PRINT = 4HNO
0045     10 WRITE(CRT,15)
0046   015  FORMAT("",
0047       *      10X,55'*',/,
0048       *10X,"*",20X,"PROGRAM  WR14",20X,"*",/,
0049       *10X,"*",7X,"READ, LIST, AND STORE A DISC SCAN FILE",8X,"*",/,
0050       *10X,55'*')
0051        WRITE (CRT,29) PRINT,PLCRT,STAPE,NAMEF
0052   029  FORMAT (1X,"TOGGLE SWITCH OPTIONS",14X,"PRESENT VALUES",/,
0053       *"    1 - List data on printer.............",1A4,/,
0054       *"    2 - Plot data on the CRT.............",1A4,//,
0055       *"    4 - Store data on tape...............",1A4,/,
0056       *1X,"ACTION OPTIONS",/,
0057       *"    5 - Enter file name..................",3A2,/,
0058       *"    6 - List files and specs on CRT.....",/,
```

```
0059        *"   7 - List tape file per switches 1 & 2.",/,
0060        *"   8 - Execute toggle switch options.....",/,
0061        *"   9 - Terminate.........................",/,"")
0062     610 WRITE(CRT,619)
0063     0619 FORMAT ("")
0064   C     CALL CHCK1 (CRT, TAPE, 0, 0, 1)
0065     620 WRITE (CRT, 629)
0066     629 FORMAT (/,1X,"SELECT AN OPTION NUMBER. _")
0067
0068         READ (CRT,*) IANS
0069         IF (IANS .EQ. 9999) GO TO 9990
0070         IF (IANS .EQ. 9) GO TO 9990
0071         IF (IANS .EQ. 8) GO TO 8000
0072         IF (IANS .EQ. 7) GO TO 7000
0073         IF (IANS .EQ. 6) GO TO 6000
0074         IF (IANS .EQ. 5) GO TO 5000
0075         IF (IANS .EQ. 4) GO TO 4000
0076         IF (IANS .EQ. 3) GO TO 3000
0077         IF (IANS .EQ. 2) GO TO 2000
0078         IF (IANS .EQ. 1) GO TO 1000
0079         WRITE (CRT,659)
0080     659 FORMAT (/,1X,"ERROR # WR14 - 16001 ......(WR14)",/,1X,
0081        *         "INCORRECT RESPONSE.  ENTER ANY DIGIT EXCEPT 0.")
0082         GO TO 610
0083   C-------------------------------------------------------------------
0084   C  Toggle the "PRINT" switch.
0085   C-------------------------------------------------------------------
0086    1000 IF (PRINT .EQ. 4HYES ) GO TO 1100
0087           PRINT = 4HYES
0088   C     CALL LPSTS (PRNT, UP)
0089   C     IF (UP .EQ. .TRUE.) GO TO 1400
0090   C       WRITE (CRT, 1009)
0091   C1009 FORMAT (/,1X,"ERROE # WR14 - 16004 ......(WR14)",/,1X,
0092   C    *        "PRINTER IS NOT UP")
0093   C     GO TO 620
0094         GO TO 1400
0095    1100   PRINT = 4HNO
0096    1400 WRITE (CRT, 1409) I1, PRINT
0097    1409 FORMAT (1A2, "a 41c 5Y",1A4)
0098         GO TO 610
0099   C-------------------------------------------------------------------
0100   C  Toggle the "plot on CRT" switch.
0101   C-------------------------------------------------------------------
0102    2000 IF (PLCRT .EQ. 4HYES ) GO TO 2100
0103           PLCRT = 4HYES
0104           GO TO 2400
0105    2100   PLCRT = 4HNO
0106    2400 WRITE (CRT, 2409) I1, PLCRT
0107    2409 FORMAT (1A2,"a 41c 6Y",1A4)
0108         GO TO 610
0109   C-------------------------------------------------------------------
0110   C  Toggle the "plot on plotter" switch.
0111   C-------------------------------------------------------------------
0112    3000 IF (PLPLT .EQ. 4HYES ) GO TO 3100
0113           PLPLT = 4HYES
0114           GO TO 3400
0115    3100   PLPLT = 4HNO
0116    3400 WRITE (CRT, 3409) I1, PLPLT
0117    3409 FORMAT (1A2,"a 41c 7Y",1A4)
0118         GO TO 610
```

```
0119  C-------------------------------------------------------------------
0120  C  Toggle the "store data on tape" switch.
0121  C-------------------------------------------------------------------
0122   4000 IF (STAPE .EQ. 4HYES ) GO TO 4100
0123        IWAIT = 1
0124          CALL CHCK1 (CRT, TAPE, IWAIT, 0, 1)
0125          STAPE = 4HYES
0126          GO TO 4400
0127   4100   STAPE = 4HNO
0128   4400 WRITE (CRT, 4409) I1, STAPE
0129   4409 FORMAT (1A2,"a 41c 8Y",1A4)
0130        GO TO 610
0131  C-------------------------------------------------------------------
0132  C  Enter file name.
0133  C-------------------------------------------------------------------
0134   5000 WRITE (CRT,5009)
0135   5009 FORMAT (/,1X,"Enter file name. _")
0136        READ (CRT,5019) NAMEF
0137   5019 FORMAT (3A2)
0138        IF ((NAMEF(1) .EQ. 2H99) .AND. (NAMEF(2) .EQ. 2H99)) GO TO 9998
0139   5300 WRITE (CRT, 5309) I1, NAMEF
0140   5309 FORMAT (1A2,"a 41c 10Y",3A2)
0141        GO TO 610
0142  C-------------------------------------------------------------------
0143  C  List files and specifications on the CRT.
0144  C-------------------------------------------------------------------
0145   6000 WRITE (CRT,6009)
0146   6009 FORMAT ("","FILE     TIME     DATE         #AZ ASTEPS  ",
0147       *         "VA  #VA VSTEPS  RFREQ  #FR  FSTEP",/,
0148       *           "------ -------- ----------  --- ------  ",
0149       *         "--  --- ------  -----  ---  -----")
0150          NAMES(1) = 2HSC
0151          NAMES(2) = 2HS1
0152   6010   NAMES(3) = 2H1@
0153        DO 6200 I = 1,31
0154         IF (IFBRK(IERR)) 10,6020
0155   6020  NAMES(3) = NAMES(3) + 1
0156         CALL OPEN (IDCB, IERR, NAMES)
0157         IF (IERR .EQ. -6) GO TO 6200
0158         IF (IERR .GE. 0) GO TO 6050
0159         CALL ERRMS (ALPHLU, IERR, 6HOPEN  )
0160         GO TO 620
0161   6050 CALL READF (IDCB, IERR, IFAT, 3120)
0162        IF (IERR .EQ. 0) GO TO  6100
0163          CALL ERRMS (ALPHLU, IERR, 6HREADF )
0164          GO TO 620
0165   6100 WRITE (CRT,6109) NAMES, (IFAT(J), J=1,4), (IFAT(J), J=9,12),
0166       *                  IFAT(15), IFAT(58), FAT(30), IFAT(56), IFAT(62),
0167       *                  (FAT(J), J=32,33), IFAT(70), FAT(36),
0168       *                  (IFAT(J), J=16,54)
0169   6109 FORMAT (3A2,1X,4A2,1X,5A2,2X,I3,1X,F6.2,2X,1A2,2X,I3,1X,F6.2,
0170       *         2X,F5.0,2X,I3,2X,F5.0,/,39A2)
0171   6200 CONTINUE
0172        IF (NAMES(2) .NE. 2HS1) GO TO 6250
0173          NAMES(2) = NAMES(2) + 1
0174          GO TO 6010
0175   6250 IF (NAMES(1) .NE. 2HSC) GO TO 6300
0176          NAMES(1) = 2HSR
0177          GO TO 6010
0178   6300 WRITE (CRT, 6309)
```

```
0179   6309 FORMAT (1X,"THAT IS ALL THE FILES.  PRESS 'RETURN' WHEN READY.")
0180        READ (CRT,*) IANS
0181        GO TO 10
0182  C-------------------------------------------------------------------------
0183  C  List tape file per switches 1 & 2.
0184  C-------------------------------------------------------------------------
0185   7000 IF (NF .NE. 0) GO TO 7100
0186        WRITE (CRT, 7009)
0187   7009 FORMAT (/,1X,"ERROR @ WR14 - 16002 ......(WR14)",/,1X,
0188       *        "THERE ARE NO TAPE FILES TO LIST.")
0189        GO TO 620
0190   7100 WRITE (CRT, 7109)
0191   7109 FORMAT (/,1X,"Enter 0 for last file or N for file #N. _")
0192        READ (CRT,*) JANS
0193        IF (JANS .EQ. 9999) GO TO 9998
0194        IF (JANS .EQ. 0) GO TO 7500
0195        IF (JANS .LE. NF) GO TO 7200
0196        WRITE (CRT, 7119) NF
0197   7119 FORMAT (/,1X,"ERROR @ WR14 - 16003 ......(WR14)",/,1X,
0198       *        "NO SUCH FILE #.  ENTER ANY NUMBER UP TO ",I2)
0199        GO TO 7100
0200   7200 CALL EXEC (3, 410B)
0201        IF (JANS .EQ. 1) GO TO 7700
0202        DO 7300 I = 1, JANS-1
0203   7300 CALL EXEC (3, 1310B)
0204        GO TO 7700
0205   7500 CALL EXEC (3, 1410B)
0206        CALL EXEC (3, 1410B)
0207        IF (NF .EQ. 1) GO TO 7700
0208        CALL EXEC (3, 1310B)
0209   7700 ICODE = 1
0210        GO TO 8090
0211  C-------------------------------------------------------------------------
0212  C  Read and write first record and distribute data.
0213  C-------------------------------------------------------------------------
0214   8000 IF (NAMEF(1) .NE. 2H  ) GO TO 8010
0215          WRITE (CRT,8009)
0216   8009 FORMAT (/,1X,"ERROR @ WR14 - 16004 ......(WR14)",
0217       *        /,1X,"NO FILE NAME HAS BEEN ENTERED.")
0218          GO TO 620
0219   8010 CALL OPEN (IDCB,IERR,NAMEF)
0220        IF (IERR .NE. -6) GO TO 8020
0221        WRITE (CRT,8019)
0222   8019 FORMAT (/,1X,"ERROR @ WR14 - 16005 ......(WR14)",/,
0223       *          1X,"THIS FILE NOT FOUND ON DISC.",/,
0224       *          1X,"TRY A DIFFERENT FILE NAME.")
0225        GO TO 620
0226   8020 IF (IERR .GE. 0) GO TO 8040
0227        CALL ERRMS (ALPHLU, IERR, 6HOPEN  )
0228        GO TO 9998
0229   8040 CALL READF (IDCB, IERR, IFAT, 3120, LEN)
0230        IF (IERR .EQ. 0) GO TO 8060
0231          CALL ERRMS (ALPHLU, IERR, 6HREADF )
0232          GO TO 620
0233   8060 ICODE = 2
0234        IRECS = IFAT(68)
0235        IF (STAPE .EQ. 4HNO  ) GO TO 8100
0236        DO 8080 I = 1, 3
0237   8080 IFAT(72+I) = NAMEF(I)
0238   8090 CALL EXEC (ICODE, 10B, IFAT, IRECS)
```

```
0239   8100 WRITE (CRT, 8109)
0240   8109 FORMAT ("")
0241        DO 8200 I = 1, 15
0242   8200 IDATIM(I) = IFAT(I)
0243        DO 8300 I = 1, 40
0244   8300 ITITL(I) = IFAT (15+I)
0245        NOTAV = IFAT(56)
0246        IAEND = IFAT(58)
0247        ASTEPS = FAT(30
0248        IVEND = IFAT(62)
0249        VSTEPS = FAT(32)
0250        RFREQ  = FAT(33)
0251        IF (IANS .NE. 7) GO TO 8370
0252          DO 8350 I = 1, 3
0253   8350   NAMEF(I) = IFAT (72+I)
0254   8370 IF (NOTAV .EQ. 2HRO) GO TO 8400
0255          IFEND = IFAT(70)
0256          FSTEPS = FAT(36)
0257          IVNAM(1) = 2HEL
0258          IVNAM(2) = 2HEV
0259          IVNAM(3) = 2HAT
0260          IVNAM(4) = 2HIO
0261          IVNAM(5) = 2HN
0262          GO TO 8450
0263   8400 IFEND = 1
0264        IVNAM(1) = 2HAN
0265        IVNAM(2) = 2HGL
0266        IVNAM(3) = 2HE
0267        IVNAM(4) = 2H
0268        IVNAM(5) = 2H
0269   C-------------------------------------------------------------------------
0270   C   Variable loop from 1 to IVEND and frequency loop from 0 to IFEND-1
0271   C-------------------------------------------------------------------------
0272   8450 PRESVA = 0
0273        DO 8800 J=1,IVEND
0274        DO 8700 K = 0,IFEND-1
0275        PRESFR = RFREQ + K * FSTEPS
0276        IF (IANS .EQ. 7) GO TO 8463
0277        CALL READF (IDCB, IERR, IFAT, IRECS)
0278        IF (IERR .EQ. 0) GO TO 8460
0279          CALL ERRMS (ALPHLU, IERR, 6HREADF )
0280          GO TO 620
0281   8460 IF (STAPE .EQ. 4HNO  ) GO TO 8465
0282   8463 CALL EXEC(ICODE, 10B, IFAT, IRECS)
0283   8465 IF (PRINT .EQ. 4HNO  ) GO TO 8480
0284          PRESVA = DAT(1, IAEND+1)
0285        WRITE (PRNT,8469) TYPEF(ICODE),NAMEF,IDATIM,ITITL,IVNAM,PRESVA,
0286       *                  PRESFR
0287   8469 FORMAT ("1",/,1X,1A4," FILE ",3A2,1X,15A2,//,1X,40A2,//
0288       *         1X,5A2,"=",F8.3,"   FREQUENCY =",F6.0,//,
0289       *         1X,"AZIMUTH        ATTENUATION      PHASE",/,
0290       *         1X,"--------       -----------      --------")
0291   8480 IF (PLCRT .EQ. 4HNO  ) GO TO 8590
0292        YMIN = 100000.
0293        YMAX = -YMIN
0294        XMIN = DAT(1,1)
0295        XMAX = DAT(1,IAEND)
0296        DO 8500 I=1, IAEND
0297        IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0298        IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)
```

```
0299   8500 CONTINUE
0300        CALL ZBEGN
0301        CALL ENDEV (ALPHLU, GOUTLU, IERR)
0302        IF (IERR .NE. 0) GO TO 620
0303  C-----------------------------------------------------------------------
0304  C  Perform the viewing transformation, exit if any errors
0305  C-----------------------------------------------------------------------
0306        IF (ABS(YMIN) .NE. YMIN) GO TO 8510
0307        YMIN = INT (YMIN)
0308        GO TO 8520
0309   8510 YMIN = INT (YMIN - .999)
0310   8520 IF (ABS(YMAX) .NE. YMAX) GO TO 8530
0311        YMAX = INT (YMAX + .999)
0312        GO TO 8540
0313   8530 YMAX = INT (YMAX)
0314   8540 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0315        IF (ABS(XMIN) .NE. XMIN) GO TO 8550
0316        XMIN = INT (XMIN)
0317        GO TO 8560
0318   8550 XMIN = INT (XMIN - .999)
0319   8560 IF (ABS(XMAX) .NE. XMAX) GO TO 8570
0320        XMAX = INT (XMAX + .999)
0321        GO TO 8580
0322   8570 XMAX = INT (XMAX)
0323   8580 CALL VIEWT (IERR,XMIN,XMAX,YMIN,YMAX)
0324        IF (IERR .NE. 0) GOTO 620
0325  C-----------------------------------------------------------------------
0326  C  Draw axis and label, then plot.
0327  C-----------------------------------------------------------------------
0328        CALL DRWDT (XMIN, XMAX, YMIN, YMAX, DAT, IAEND)
0329  C-----------------------------------------------------------------------
0330  C  Print out data on line printer
0331  C-----------------------------------------------------------------------
0332   8590 IF (PRINT .EQ. 4HNO  ) GO TO 8700
0333        DO 8600 I = 1, IAEND
0334   8600   WRITE (PRNT,8609) (DAT(II,I),II=1,3)
0335   8609   FORMAT (1X,F8.3,7X,F8.3,7X,F8.3)
0336   8700 CONTINUE
0337   8800 CONTINUE
0338  C-----------------------------------------------------------------------
0339  C  End of rotation loop
0340  C-----------------------------------------------------------------------
0341        IF (IANS .EQ. 7) GO TO 8810
0342        IF (STAPE .EQ. 4HNO  ) GO TO 8803
0343        CALL EXEC (3, 110B)
0344        NF = NF + 1
0345   8803 CALL RWNDF (IDCB,IERR)
0346        IF (IERR .EQ. 0) GO TO 8900
0347          CALL ERRMS (ALPHLU, IERR, 6HRWNDF )
0348          GO TO 620
0349   8810 IF (JANS .NE. 0) GO TO 8850
0350        CALL EXEC (3, 1310B)
0351        GO TO 8900
0352   8850 DO 8860 I = 1, NF-JANS+1
0353   8860 CALL EXEC (3, 1310B)
0354   8900 WRITE (CRT,8909)
0355   8909 FORMAT (" 0356         GO TO 10
0357  C-----------------------------------------------------------------------
0358  C  Terminate program
0359  C-----------------------------------------------------------------------
```

```
0360   9990 CONTINUE
0361   9998 WRITE(CRT,9999)
0362  09999 FORMAT(" 0363         WRITE (CRT,999)
0364    999 FORMAT (/,10X,
0365       *"**********  PROGRAM WR14 TERMINATED  **********")
0366        CALL CLOSE (IDCB)
0367        END
0368  C
0369  C*************************************************************************
0370  C                       ENDEV SUBROUTINE
0371  C
0372  C  PURPOSE:       This subroutine enables all logical devices used by
0373  C                  the program.
0374  C
0375  C  DESCRIPTION:   This subroutine enables the DGL work station.  The DGL
0376  C                  workstation contains alphanumeric and graphics output
0377  C                  devices.
0378  C
0379  C  CALLING SEQUENCE:  CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0380  C
0381  C  PARAMETERS:
0382  C                  ALPHLU:   [INTEGER]; Alphanumeric LU
0383  C                  GOUTLU:   [INTEGER]; Graphics output LU
0384  C                  STATUS:   [INTEGER]; Set to zero if no errors occur
0385  C                                       during initialization of the
0386  C                                       workstation.  It is set to the
0387  C                                       DGL error return value if an
0388  C                                       error is found.
0389  C
0390  C*************************************************************************
0391  C
0392        SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0393  C
0394        INTEGER ALPHLU, GOUTLU,  STATUS
0395        INTEGER CONTRL
0396  C-------------------------------------------------------------------
0397  C  If an error occurs, write out an error message, and return.
0398  C
0399  C  Enable alphanumeric device
0400  C-------------------------------------------------------------------
0401        CALL ZAINT (ALPHLU,STATUS)
0402        IF (STATUS .EQ. 0) GOTO 1000
0403          CALL ERRMS (ALPHLU,STATUS,6HZAINT )
0404   1000 CONTINUE
0405  C-------------------------------------------------------------------
0406  C  Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0407  C-------------------------------------------------------------------
0408        CONTRL = 0
0409        CALL ZDINT (GOUTLU,CONTRL,STATUS)
0410          IF (STATUS .EQ. 0) GOTO 9999
0411          CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0412   9999 CONTINUE
0413  C-------------------------------------------------------------------
0414  C Return to main program after all devices are properly enabled
0415  C-------------------------------------------------------------------
0416        RETURN
0417        END
0418  C
0419  C*************************************************************************
0420  C
```

```
0421  C                          SUBROUTINE VIEWT
0422  C
0423  C  PURPOSE:        This subroutine performs the initial viewing
0424  C                  transformation.
0425  C
0426  C  DESCRIPTION:    This subroutine performs the viewing transformation in
0427  C                  the following steps:
0428  C
0429  C                   - Places the image on the largest possible area
0430  C                   - Sets the window to the desired range.
0431  C                   - Resets the viewport to leave room for labels
0432  C                   - Recomputes character size based on specified window
0433  C
0434  C  CALLING SEQUENCE:  CALL VIEWT
0435  C
0436  C  PARAMETERS:     NONE
0437  C
0438  C*************************************************************************
0439  C
0440        SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0441  C
0442        INTEGER IDUM, IERR
0443        REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0444        REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0445  C
0446  C  IDUM     -  Dummy var
0447  C  IERR     -  Error return (not used)
0448  C  AR       -  Holds aspect ratio
0449  C  VIEW     -  Holds current viewport bounds
0450  C  XSIZE    -  Temp work variable
0451  C  YSIZE    -  Temp work variable
0452  C  XCSIZ    -  Temp holder of character size X
0453  C  XCSIZ    -  Temp holder of character size Y
0454  C  WXMIN    -  Temp holder of window X - min
0455  C  WXMAX    -  Temp holder of window X - max
0456  C  WYMIN    -  Temp holder of window Y - min
0457  C  WYMAX    -  Temp holder of window Y - max
0458  C  MINX     -  Temp holder of new viewport X - min
0459  C  MAXX     -  Temp holder of new viewport X - max
0460  C  MINY     -  Temp holder of new viewport Y - min
0461  C  MAXY     -  Temp holder of new viewport Y - max
0462  C
0463  C*************************************************************************
0464  C
0465  C  Inquire aspect ratio of logical display limits
0466  C-------------------------------------------------------------------------
0467        CALL ZIWS (254,0,2,IDUM,AR,IERR)
0468        IF (IERR .EQ. 0) GO TO 555
0469          CALL ERRMS (1,IERR,6HZIWS  )
0470          GO TO 9999
0471  C-------------------------------------------------------------------------
0472  C  Make the largest possible area of the logical display available
0473  C  for graphical output by setting the aspect ratio(AR).
0474  C-------------------------------------------------------------------------
0475    555 YSIZE = AR(2)
0476        XSIZE = 1.0
0477        CALL ZASPK (XSIZE,YSIZE)
0478  C-------------------------------------------------------------------------
0479  C  Specify the desired range of X and Y values of the window
0480  C-------------------------------------------------------------------------
```

```
0481        CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0482  C-----------------------------------------------------------------------
0483  C  Inquire current viewport limits
0484  C-----------------------------------------------------------------------
0485        CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0486        IF (IERR .EQ. 0) GO TO 577
0487          CALL ERRMS (1,IERR,6HZIWS  )
0488          GO TO 9999
0489  C-----------------------------------------------------------------------
0490  C  Calculate the lower left hand corner of the viewport and leave
0491  C  enough room for labels.  The viewport is reduced 12% on each side
0492  C  to give room for lables.  Set the new viewport
0493  C-----------------------------------------------------------------------
0494    577 MINX = .12 * VIEW(2)
0495        MAXX = .88 * VIEW(2)
0496        MINY = .12 * VIEW(4)
0497        MAXY = .88 * VIEW(4)
0498        CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0499  C-----------------------------------------------------------------------
0500  C  Now set the character size based on the size of the window
0501  C  The constants below produce a readable character size in the new
0502  C  window.
0503  C-----------------------------------------------------------------------
0504        XCSIZ = .015 * (WXMAX - WXMIN)
0505        YCSIZ = .025 * (WYMAX - WYMIN)
0506        CALL ZCSIZ (XCSIZ,YCSIZ)
0507  C
0508   9999 RETURN
0509        END
0510  C*************************************************************************
0511  C                          SUBROUTINE DRWDT
0512  C
0513  C  PURPOSE:       This subroutine draws the current graph.
0514  C
0515  C  DESCRIPTION:  This subroutine clears the alphanumeric and graphics
0516  C                displays.  It then draws the current graph.  Note
0517  C                that if the user has not changed any data values
0518  C                the default values will be used.
0519  C
0520  C  CALLING SEQUENCE:  CALL DRWDT
0521  C
0522  C  PARAMETERS:   NONE
0523  C
0524  C*************************************************************************
0525  C
0526        SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
0527        REAL DAT(3,520)
0528        DIMENSION ILIST(3)
0529        INTEGER TEXT(12),OPCODE,RSIZE
0530  C
0531        REAL VIEW(4)
0532  C
0533  C  VIEW    -  Temp holder of viewport bounds
0534  C
0535  C*************************************************************************
0536  C
0537  C  Clear the graphics and alphanumeric displays
0538  C-----------------------------------------------------------------------
0539        CALL ZNEWF
0540        CALL CLEAR
```

```
0541  C-----------------------------------------------------------------------
0542  C  Determine parameters for LAXES call.
0543  C-----------------------------------------------------------------------
0544  C-----------------------------------------------------------------------
0545        XTIC = (XMAX-XMIN)/10.0
0546        YTIC = (YMAX-YMIN) / 10.0
0547        XORG = XMIN
0548        YORG = YMIN
0549        XMJC = 1.0
0550        YMJC = 1.0
0551        TSIZE = .02
0552        CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0553  C-----------------------------------------------------------------------
0554  C  Plot the graph.
0555  C-----------------------------------------------------------------------
0556        CALL ZMOVE(DAT(1,1),DAT(2,1))
0557        DO 5000 I=2, IAEND
0558        CALL ZDRAW(DAT(1,I),DAT(2,I))
0559   5000 CONTINUE
0560  C-----------------------------------------------------------------------
0561  C  Change the viewport to the maximum posible so text strings may be
0562  C  placed anywhere on the view surface.  Output the text strings, then
0563  C  reset the viewport.
0564  C-----------------------------------------------------------------------
0565   6000  CALL VPMAX (VIEW)
0566         TEXT(1) = 2HRe
0567         TEXT(2) = 2Hla
0568         TEXT(3) = 2Hti
0569         TEXT(4) = 2Hve
0570         TEXT(5) = 2H P
0571         TEXT(6) = 2Hos
0572         TEXT(7) = 2Hit
0573         TEXT(8) = 2Hio
0574         TEXT(9) = 2Hn
0575         TEXT(10) = 2H(m
0576         TEXT(11) = 2Hm)
0577         TEXT(12) = 6412B
0578         NMTEXT = 24
0579         XTEXT = 0.0
0580         YTEXT = YMIN + (YMAX-YMIN)/21.0
0581  C
0582         CALL ZMOVE (XTEXT,YTEXT)
0583         OPCODE=1052
0584         ISIZE=1
0585         RSIZE=0
0586         ILIST(1)=6
0587         CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0588         IF (IERR .EQ. 0) GO TO 6010
0589           CALL ERRMS (1,IERR,6HZOESC )
0590   6010  CALL ZTEXT (NMTEXT,TEXT)
0591  C
0592  C       CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0593  C       IF (IERR .EQ. 0) GO TO 6020
0594  C         CALL ERRMS (1,IERR,6HZIESC )
0595  C         GO TO 9999
0596   6020  TEXT(1) = 2HAt
0597         TEXT(2) = 2Hte
0598         TEXT(3) = 2Hnu
0599         TEXT(4) = 2Hat
0600         TEXT(5) = 2Hio
```

```
0601          TEXT(6) = 2Hn
0602          TEXT(7) = 2H(d
0603          TEXT(8) = 2Hb)
0604          TEXT(9) = 6412B
0605          NMTEXT = 18
0606          XTEXT = XMIN + (XMAX -XMIN)/30.0
0607          YTEXT = YMIN + (YMAX-YMIN)/2.0
0608          OPCODE = 1050
0609          ILIST(1) = 1
0610          ISIZE = 1
0611          RSIZE = 0
0612          CALL ZMOVE(XTEXT,YTEXT)
0613          CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0614          IF (IERR .EQ. 0) GO TO 6030
0615            CALL ERRMS (1,IERR,6HZOESC )
0616            GO TO 9999
0617    6030  CALL ZTEXT(NMTEXT,TEXT)
0618          OPCODE=1050
0619          ILIST(1) = 0
0620          ISIZE = 1
0621          RSIZE = 0
0622          CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0623          IF (IERR .EQ. 0) GO TO 6040
0624            CALL ERRMS (1,IERR,6HZOESC )
0625            GO TO 9999
0626    C
0627     6040 CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0628          CALL ZMCUR
0629    C
0630     9999 RETURN
0631          END
0632    C
0633    C*************************************************************************
0634    C                              SUBROUTINE ERRMS
0635    C
0636    C  PURPOSE:       To write out an error message.
0637    C
0638    C  DESCRIPTION:   This subroutine writes an error message to the alphanumeric
0639    C                 LU.  The error number and DGL subroutine name that the error
0640    C                 occured during is reported.
0641    C
0642    C  CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0643    C
0644    C  PARAMETERS:
0645    C                 ALPHLU:    [INTEGER];  The alphanumeric LU
0646    C
0647    C                 ERROR:     [INTEGER];  The error number of the error to
0648    C                                        reported
0649    C
0650    C                 SUBR:      [INTEGER];  An array containing the name of
0651    C                                        the subroutine where the error occured
0652    C
0653    C*************************************************************************
0654    C
0655          SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0656          INTEGER ALPHLU,ERROR,SUBR(3)
0657    C
0658    C  Write out the error message
0659    C
0660          CALL ZMCUR
```

```
0661         WRITE(ALPHLU,100) ERROR, SUBR
0662     100 FORMAT(" Error ",I3," occurred in subroutine ",3A2)
0663   C
0664         RETURN
0665         END
0666   C
0667   C*************************************************************************
0668   C                    SUBROUTINE CLEAR
0669   C
0670   C  PURPOSE:       To clear the alphanumeric display
0671   C
0672   C  DESCRIPTION:   This subroutine will clear the alphanumeric display
0673   C                 of a HP 2647 or HP 2648 terminal.  If the display is
0674   C                 not a HP 2647 or HP 2648 then the call has no effect.
0675   C
0676   C  CALLING SEQUENCE: CALL CLEAR
0677   C
0678   C  PARAMETERS:        NONE
0679   C
0680   C*************************************************************************
0681   C
0682         SUBROUTINE CLEAR
0683         INTEGER ILIST(7), STRING(2), IERR
0684         REAL DUMMY
0685   C
0686   C  ILIST  - Information list returned by ZIWS
0687   C  IERR   - Error information returned by ZIWS (not used here)
0688   C  DUMMY  - Real information returned by ZIWS (none in this case)
0689   C  STRING - Device-dependent commands that clear a 264X terminal
0690   C
0691         DATA STRING /15550B,              15512B/
0692   C                   /    \                /    \
0693   C                33B   +  150B          33B  +  112B
0694   C                esc       h            esc      J
0695   C                (home cursor)         (clear display)
0696   C
0697   C*************************************************************************
0698   C
0699   C  Inquire the status of the alphanumeric device:
0700   C  upon return, ILIST(4) = -1  ==> no alpha device,
0701   C                        =  0  ==> it is disabled,
0702   C                        =  1  ==> it is enabled.
0703   C  If it is not enabled, just return.
0704   C
0705         CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
0706         IF (IERR .EQ. 0) GO TO 7070
0707           CALL ERRMS (1,IERR,6HZIWS  )
0708           GO TO 9999
0709    7070 IF (ILIST(4) .NE. 1) GOTO 9999
0710   C
0711   C  Alpha device is enabled. Make sure it is '264X' type then clear.
0712   C
0713         IF (ILIST(1) .NE. 2H26) GOTO 9999
0714         IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
0715         CALL ZALPH (4,STRING)
0716   C
0717    9999 RETURN
0718         END
0719   C
0720   C*************************************************************************
```

```
C
C                              SUBROUTINE VPMAX
C
C  PURPOSE:        Set the viewport to the maximum limits.
C
C  DESCRIPTION:    The current viewport is saved in VIEW.  The viewport
C                  is then set to the maximum limits.
C
C  CALLING SEQUENCE:  CALL VPMAX (VIEW)
C
C  PARAMETERS:
C                  VIEW:  (REAL ARRAY OF 4);  This array contains the
C                                             viewport before it was
C                                             maximized.
C
C*****************************************************************************
C
      SUBROUTINE VPMAX (VIEW)
      REAL VIEW(4)
C
      INTEGER IDUM
      REAL AR(2), NEWX, NEWY
C
C  IDUM    - Dummy work variable
C  AR      - Temp holder of the aspect ratio
C  NEWX    - Temp work variable
C  NEWY    - Temp work variable
C
C*****************************************************************************
C
C  Inquire current viewport and save it in array VIEW
C
      CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
      IF (IERR .EQ. 0) GO TO 8080
        CALL ERRMS (1,IERR,6HZIWS  )
        GO TO 9999
C
C  Inquire the maximum aspect ratio
C
 8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
C
C  Set viewport to maximum dimensions
C
      NEWY = 1.
      NEWX = 1.
      IF (AR(2) .LE. 1.) NEWY = AR(2)
      IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
      CALL ZVIEW (0.0,NEWX,0.0,NEWY)
C
 9999 RETURN
      END
      END$
```

```
&WR15M T=00004 IS ON CR00002 USING 00011 BLKS R=0074

0001  FTN4,L
0002  C 24998-18466 REV.2040 (810304.1057)
0003  C*******************************************************************************
0004  C
0005  C                          PROGRAM WR15
0006  C
0007  C  DESCRIPTION:
0008  C   WR15 is designed to obtain microwave transmission data at different
0009  C   points along a raster scan and to store the data in a disc file.
0010  C   This program has been divided into four segments because it cannot
0011  C   fit into memory otherwise.  The main segment always remains in
0012  C   memory.  Segment WR15C is the control segment, which is the first
0013  C   one read in by the main segment.  The other two are WR15G, which
0014  C   plots on the plotter and WR15T, which plots on the terminal.
0015  C   WR15C gives the user a choice of where to plot for each run, so
0016  C   essentially, for each run there are only three segments.  The
0017  C   two segments beside the main overlay each other by one segment
0018  C   calling EXEC(8, other segment name) to read in the other
0019  C   segment over the calling segment and then pass control to it.
0020  C   It can return to the calling segment only by calling EXEC(8,
0021  C   other segment name) again.
0022  C   This segment is the main segment.  It is run by typing in:
0023  C                    RU,WR15
0024  C   This segment only defines common, initializes variables, and
0025  C   then calls EXEC(8,WR15C) to read in and pass control to segment
0026  C   WR15C.
0027  C
0028  C*******************************************************************************
0029  C
0030        PROGRAM WR15
0031  C
0032        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0033       *          ISIZE(2),ITITL(40),PLUNIT(2)
0034        INTEGER CRT,PRNT
0035        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0036       *       IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESEL,IDCB,NAMEF,
0037       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0038       *       PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0039        COMMON/AGS2C/ D(10)
0040        IRNUM = 1
0041        CRT = 1
0042        IPRNM(1) = 1HW
0043        IPRNM(2) = 1HR
0044        IPRNM(3) = 1H1
0045        IPRNM(4) = 1H5
0046        IPRNL = 4
0047        MESS = -1
0048        ASTEPS = 5
0049        IAEND  = 4
0050        ESTEPS = 30
0051        IEEND  =  3
0052        IPEND = 1
0053        ISEND = 1
0054        IDONE = 0
0055        PRESAZ = 999.9
0056        IPFLAG = 1
0057        ILFLAG = 1
0058        PLUNIT(1) = 4H - C
```

```
0059          PLUNIT(2) = 4HRT
0060          IGRLOC = 1
0061          IFEND = 1
0062          NAMEF(1) = 2HSC
0063          NAMEF(2) = 2HS2
0064          NAMEF(3) = 2H1@
0065          PRNT = 6
0066          CALL FILE2(1)
0067          TEMP1 = D(1)
0068          TEMP2 = (D(3) - 1) * D(2) + D(1)
0069          RFREQ = D(1)
0070    C-------------------------------------------------------------------
0071    C  Call EXEC to read in segment WR1SC and pass control to it.
0072    C-------------------------------------------------------------------
0073    C
0074          ICODE=8
0075          INAME(1)=2HWR
0076          INAME(2)=2H15
0077          INAME(3)=2HC
0078          CALL EXEC (ICODE, INAME)
0079          END
0080    C
0081    C  Block data routine for AGS2C
0082    C
0083          BLOCK DATA AGS2C
0084          COMMON /AGS2C/ I(2330)
0085          END
0086          END$
```

```
&WR15C T=00004 IS ON CR00015 USING 00101 BLKS R=0562

0001   FTN4,L
0002   C      ****************************************************************
0003   C      *                                                              *
0004   C      *            SEGMENT:  WR15C                                   *
0005   C      *                                                              *
0006   C      *            ++++++++++++++++++++++++++++++++++++++            *
0007   C      *      FOR:  Walter Reed Army Institute of Research            *
0008   C      *            Department of Microwave Research                  *
0009   C      *            Walter Reed Army Medical Center                   *
0010   C      *            Washington, DC 20112                              *
0011   C      *                                                              *
0012   C      *            ++++++++++++++++++++++++++++++++++++++            *
0013   C      *                                                              *
0014   C      *       BY:  Technology USA, Inc.                              *
0015   C      *            P.O. Box 55333                                    *
0016   C      *            Fort Washington, Maryland 20744                   *
0017   C      *            Phone: (301) 292-2592                             *
0018   C      *                                                              *
0019   C      *  ------------------------------------------------------------*
0020   C      *     Segment WR15C is the control segment of WR15.  It puts   *
0021   C      *  out a menu with the options:                                *
0022   C      *    1 - Enter the number of azimuth steps and step size.      *
0023   C      *    2 - Enter the number of elevation steps and step size.    *
0024   C      *    3 - Enter the microwave frequency.                        *
0025   C      *    4 - Set antennae to a new azimuth position.               *
0026   C      *    5 - Set antennae to a new elevation position.             *
0027   C      *    6 - Enter number of readings to average for each point.   *
0028   C      *    7 - Request graphs on the CRT.                            *
0029   C      *   10 - List on the printer.                                  *
0030   C      *   11 - Enter number of frequency steps and step size.        *
0031   C      *    8 - Scan from the present position                        *
0032   C      *    9 - Terminate the program.                                *
0033   C      *  After 8 is chosen, the antennae are positioned at the       *
0034   C      *  present position-(number of data points-1)*step size/2.     *
0035   C      *  The amplitude and phase are each averaged over the number   *
0036   C      *  of readings specified in 6 and saved in the array DAT       *
0037   C      *  along with the position.  Then the antennae are advanced    *
0038   C      *  by step size and the amplitude and phase are read again.    *
0039   C      *  This is repeated for the specified number of steps per      *
0040   C      *  scan.                                                       *
0041   C      *  After each scan, the data accumulated in array DAT is       *
0042   C      *  read out to a disc file, SCS12A.  If there is a file        *
0043   C      *  with that name already, the last letter is incremented.     *
0044   C      *  After the data is read out, elevation is incremented by     *
0045   C      *  elevation step size and the whole process repeated for      *
0046   C      *  the number of elevation steps.                              *
0047   C      *                                                              *
0048   C      ****************************************************************
0049          PROGRAM WR15C,5
0050          DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0051         *          ISIZE(2),ITITL(40),IREG(2),IFAT(3120),PRNTL(2),
0052         *          PLUNIT(2),FAT(1560)
0053          INTEGER CRT,PRNT
0054          COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0055         *       IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESEL,IDCB,NAMEF,
0056         *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0057         *       PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0058          EQUIVALENCE (REG,IREG),(DAT,IFAT),(DAT,FAT)
```

```
0059  C
0060        COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,NONLY,
0061       *CM(4,112),IHEAD(40),IDATE(15)
0062        DATA LUAZ/31/,LUEL/35/,I1/15446B/
0063  C-----------------------------------------------------------------------
0064  C  Set number of scans if plots requested.
0065  C-----------------------------------------------------------------------
0066  C  If start of program, go to menu.
0067        IF (PRESAZ .EQ. 999.9) GO TO 525
0068  C  If graphing on screen, do not list data there.
0069        IF (IGRLOC .EQ. 1) ILFLAG = 0
0070  C  If finished with run, go reset position.
0071        IF (IDONE .GE. IEEND) GO TO 515
0072  C  If plotting every scan, go do next scan.
0073        IF (IPEND .EQ. 1) GO TO 8701
0074        IF (IDONE .NE. 1) GO TO 511
0075        IF (IPEND .GT. IEEND) GO TO 513
0076  C  Plotted first scan so now get back on schedule.
0077          ISEND = IPEND - 1
0078          GO TO 8701
0079    511 IF (IDONE+IPEND .GT. IEEND) GO TO 513
0080  C  Plot every specified scan.
0081          ISEND = IPEND
0082          GO TO 8701
0083  C  Scan to end of run without plotting.
0084    513   ISEND = IEEND - IDONE
0085          IPFLAG = -1
0086          GO TO 8701
0087  C-----------------------------------------------------------------------
0088  C  Reset original position.
0089  C-----------------------------------------------------------------------
0090    515 WRITE (CRT, 519)
0091   519  FORMAT (/,1X,"SCAN IS FINISHED",/,1X,
0092       *        "ANTENNAE ARE BEING RESET TO THEIR ORIGINAL POSITION",
0093       *        /,1X,"PLEASE EXCUSE THE DELAY")
0094        CALL SETPO (CRT, LUAZ, PRESAZ, 2, IERR)
0095        IF (IERR .EQ. 0) GO TO 522
0096          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0097          GO TO 9090
0098   522  PRESEL = PRESEL - ESTEPS*(IEEND-1)
0099        CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0100        IF (IERR .EQ. 0) GO TO 523
0101          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0102          GO TO 9090
0103  C  Reset parameters to original values.
0104    523 IF (IPFLAG .EQ. 0) GO TO 525
0105        ISEND = 1
0106        IPFLAG = 1
0107        ILFLAG = 1
0108   525  IDONE = 0
0109  C-----------------------------------------------------------------------
0110  C  Clear screen and print heading and menu.
0111  C-----------------------------------------------------------------------
0112        WRITE(CRT,529)
0113  0529  FORMAT("
0114       *       10X,55'*',/,
0115       *10X,"*",20X,"PROGRAM  WR15",20X,"*",/,
0116       *10X,"*",15X,"S21 RASTER SCAN PROGRAM",15X,"*",/,
0117       *10X,55'*',/)
0118   530  CALL WR1 (CRT, LUAZ, PRESAZ, IERR, 0)
```

```
0119          IF (IERR .EQ. 0) GO TO 540
0120            CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0121            GO TO 9090
0122    540   CALL WR1 (CRT,LUEL,PRESEL,IERR,0)
0123          IF (IERR .EQ. 0) GO TO 550
0124            CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0125            GO TO 9090
0126     550 IF (PRNT .EQ. 0) GO TO 555
0127            PRNTL(1) = 4H PRI
0128            PRNTL(2) = 4HNT
0129            GO TO 560
0130     555    PRNTL(1) = 4HNO P
0131            PRNTL(2) = 4HRINT
0132    560   WRITE(CRT,600) IAEND,ASTEPS,IEEND,ESTEPS,RFREQ,PRESAZ,PRESEL,
0133         *IRNUM,IPEND,(PLUNIT(I),I=1,2),(PRNTL(I),I=1,2),IFEND,FSTEPS
0134    0600 FORMAT(" PROGRAM PARAMETER ENTRY",30X,"PRESENT VALUES",/,
0135         *"    1 - Number of azimuth steps and step size.....",
0136         *I3," x",F6.2," mm",/,
0137         *"    2 - Number of elevation steps and step size.....",
0138         *I3," x",F6.2," mm",/,
0139         *"    3 - Microwave frequency.....",
0140         *F7.0," MHz",/,
0141         *"    4 - Azimuth position.....",
0142         *F8.3," mm",/,
0143         *"    5 - Elevation position.....",
0144         *F8.3," mm",/,
0145         *"    6 - Number of readings to average per point.....",I5,/,
0146         *"    7 - Number of scans per graphs.....",I5,1X,2A4,/,
0147         *"   10 - Toggle switch for listing on printer.....",2X,2A4,/,
0148         *"   11 - Number of frequency steps and step size.....",
0149         *I3," x",F5.0," MHz",/,
0150         *" EXECUTION OPTIONS",/,
0151         *"    8 - Scan from the present position.",/,
0152         *"    9 - Terminate the program.",/"")
0153     610 WRITE (CRT,619)
0154    C  Clear old prompt with Esc h Esc J.
0155     0619 FORMAT ("")
0156     620 WRITE (CRT,629)
0157     629 FORMAT (1X,"SELECT OPTION NUMBER _")
0158         READ(CRT,*) IANS
0159         IF (IANS .EQ. 9999) GO TO 9090
0160         IF (IANS .EQ. 10) GO TO 700
0161         IF (IANS .EQ. 11) GO TO 800
0162         IF (IANS .EQ. 9) GO TO 9090
0163         IF (IANS .EQ. 8) GO TO 8000
0164         IF (IANS .EQ. 7) GO TO 7000
0165         IF (IANS .EQ. 6) GO TO 6000
0166         IF (IANS .EQ. 5) GO TO 5000
0167         IF (IANS .EQ. 4) GO TO 4000
0168         IF (IANS .EQ. 3) GO TO 3000
0169         IF (IANS .EQ. 2) GO TO 2000
0170         IF (IANS .EQ. 1) GO TO 1000
0171         WRITE (CRT,659)
0172     659 FORMAT (/,1X,"ERROR # WR15 - 17001 ......(WR15)",/,1X,
0173        *         "INCORRECT RESPONSE.  ENTER ANY NUMBER FROM 1 TO 11.")
0174         GO TO 620
0175    C-------------------------------------------------------------------
0176    C  Set to print on printer.
0177    C-------------------------------------------------------------------
0178     700 IF (PRNT .EQ. 6) GO TO 750
```

```
0179          PRNT = 6
0180          PRNTL(1) = 4H PRI
0181          PRNTL(2) = 4HNT
0182          GO TO 760
0183     750  PRNT = 0
0184          PRNTL(1) = 4HNO P
0185          PRNTL(2) = 4HRINT
0186     760  WRITE (CRT,769) I1,(PRNTL(I),I=1,2)
0187     769  FORMAT (1A2, "a 54c 13Y",2A4)
0188          GO TO 610
0189   C-------------------------------------------------------------------
0190   C  Inquire from user:  frequency step size and number of steps.
0191   C-------------------------------------------------------------------
0192     800  WRITE (CRT,809)
0193     809  FORMAT (/,1X,"Enter the number of frequency steps.  _")
0194          READ (CRT,*) IFEND
0195          IF (IFEND .EQ. 9999) GO TO 9090
0196          IF ((IFEND .GT. 0) .AND. (IFEND*(IAEND+1) .LE. 520)) GO TO 825
0197            WRITE (CRT,819)
0198     819  FORMAT (/,1X,"ERROR # WR15 - 17002 ......(WR15)",/,
0199         * 1X,"NUMBER OF STEPS MUST BE FROM 1 - 520/(AZIMUTH STEPS + 1).",
0200         *         /,1X,"REENTER THE NUMBER OF FREQUENCY STEPS.")
0201            GO TO 800
0202     825  WRITE (CRT,829)
0203     829  FORMAT (/,1X,"Enter the frequency step size (MHz). _")
0204          READ (CRT,*) FSTEPS
0205          IF (FSTEPS .EQ. 9999) GO TO 9090
0206          DO 840 L = 0, IFEND - 1
0207            F = RFREQ + L * FSTEPS
0208            CALL CALF2(3, MC, F)
0209            CALL CALF2(2, MC, FP)
0210            IF (ABS(FP - F) .LT. 1.) GO TO 840
0211              WRITE (CRT, 838) F
0212     838      FORMAT (1X,"ERROR # WR15 - 17010 ......(WR15)",/,
0213         *             "THERE IS NO CALIBRATION DATA FOR FREQUENCY",F7.0,/,
0214         *" Select one of the following numbers for the listed result.",/,
0215         *" 1. Recalibrate.",/,
0216         *" 2. Select different frequency step size or number of steps.",/,
0217         *" 3. Proceed with these frequencies, do not correct if no data.")
0218            READ (CRT, *) IANS
0219            IF (IANS .EQ. 1) GO TO 9000
0220            IF (IANS .EQ. 2) GO TO 800
0221            IF (IANS .EQ. 3) GO TO 850
0222            GO TO 800
0223     840  CONTINUE
0224     850  WRITE (CRT,859) I1, IFEND, FSTEPS
0225     859  FORMAT (1A2,"a 52c 14Y",I3," x",F5.0)
0226          GO TO 610
0227   C-------------------------------------------------------------------
0228   C  Inquire from the user:  azimuth step size and number of steps.
0229   C-------------------------------------------------------------------
0230   1000  WRITE(CRT,1100)
0231   1100  FORMAT(/," Enter the number of azimuth steps per scan.  _")
0232         READ(CRT,*) IAEND
0233         IF (IAEND .EQ. 9999) GO TO 9090
0234         IF ((IFEND*(IAEND+1) .LE. 520) .AND. (IAEND .GT. 0)) GO TO 1190
0235           WRITE (CRT,1109)
0236    1109   FORMAT (/,1X,"ERROR # WR15 - 17203 ......(WR15)",/,
0237        *1X,"NUMBER OF STEPS MUST BE FROM 1 - 520/(FREQUENCY STEPS)-1.",/,
0238        *          1X,"REENTER THE NUMBER OF AZIMUTH STEPS.")
```

```
0239          GO TO 1000
0240  1190  WRITE(CRT,1200)
0241  1200  FORMAT(/," Enter the step size (mm)........  _")
0242        READ(CRT,*) ASTEPS
0243        IF (ASTEPS .EQ. 9999) GO TO 9090
0244        WRITE (CRT,1209) I1,IAEND,ASTEPS
0245   1209 FORMAT (1A2,"a 52c 6Y",I3," x",F6.2)
0246        GO TO 610
0247  C-------------------------------------------------------------------
0248  C  Inquire from user: elevation step size and number of steps.
0249  C-------------------------------------------------------------------
0250  2000  WRITE (CRT,2009)
0251  2009  FORMAT (/,1X,"Enter the number of elevation steps. _")
0252        READ (CRT,*) IEEND
0253        IF (IEEND .EQ. 9999) GO TO 9090
0254        IF (IEEND .GT. 0) GO TO 2028
0255          WRITE (CRT,2019)
0256   2019   FORMAT (/,1X,"ERROR # WR15 - 17404 ......(WR15)",/,
0257       *             1X,"THE NUMBER OF STEPS MUST BE GREATER THAN 0.",/,
0258       *             1X,"REENTER THE NUMBER OF ELEVATION STEPS.")
0259          GO TO 2000
0260   2028 WRITE (CRT,2029)
0261  2029  FORMAT (/,1X,"Enter the elevation step size (mm). _")
0262        READ (CRT,*) ESTEPS
0263        IF (ESTEPS .EQ.9999) GO TO 9090
0264        WRITE (CRT,2039) I1, IEEND, ESTEPS
0265   2039 FORMAT (1A2,"a 52c 7Y",I3," x",F6.2)
0266        GO TO 610
0267  C-------------------------------------------------------------------
0268  C  Inquire from the user:  microwave frequency.
0269  C-------------------------------------------------------------------
0270  3000  WRITE(CRT,3500)
0271  3500  FORMAT(/," Enter the RF frequency (MHz)...  _")
0272        READ(CRT,*)  RFREQ
0273        IF (RFREQ .EQ. 9999) GO TO 9090
0274        IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 3600
0275          WRITE (CRT,3509) TEMP1, TEMP2
0276  3509    FORMAT (/,1X,"ERROR # WR15 - 17005 ......(WR15)",/,1X,
0277       *           "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0278       *           /,1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0279       *           /,1X,"Do you wish to recalibrate?  (YES/NO) _")
0280          READ (CRT,3599) IANS
0281  3599    FORMAT (A2)
0282          IF (IANS .EQ. 2HYE) GO TO 9000
0283          GO TO 3000
0284   3600 WRITE (CRT, 3609) I1, RFREQ
0285   3609 FORMAT (1A2,"a 54c 8Y",F5.0)
0286        GO TO 610
0287  C-------------------------------------------------------------------
0288  C  Inquire new azimuth position and call WR6 to set it.
0289  C-------------------------------------------------------------------
0290  4000  WRITE (CRT,4090)
0291   4090 FORMAT (/,1X,"Enter new azimuth (mm).  _")
0292        READ (CRT,*) PRESAZ
0293        IF (PRESAZ .EQ. 9999) GO TO 9090
0294        CALL SETPO (CRT,LUAZ,PRESAZ,2,IERR)
0295        IF (IERR .EQ. 0) GO TO 4400
0296          CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0297          GO TO 620
0298   4400 WRITE (CRT,4409) I1,PRESAZ
```

```
0299   4409 FORMAT (1A2,"a 52c 9Y",F8.3)
0300        GO TO 610
0301  C-----------------------------------------------------------------------
0302  C  Inquire new elevation and call WR6 to set it.
0303  C-----------------------------------------------------------------------
0304  5000  WRITE (CRT,5090)
0305  5090  FORMAT (/,1X,"Enter new elevation _")
0306        READ (CRT,*) PRESEL
0307        IF (PRESEL .EQ. 9999) GO TO 9090
0308        CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0309        IF (IERR .EQ. 0) GO TO 5500
0310          CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0311          GO TO 620
0312   5500 WRITE (CRT,5509) I1, PRESEL
0313   5509 FORMAT (1A2,"a 52c 10Y",F8.3)
0314        GO TO 610
0315  C-----------------------------------------------------------------------
0316  C  Inquire from the user: number of readings per data point.
0317  C-----------------------------------------------------------------------
0318  6000  WRITE (CRT,6009)
0319  6009  FORMAT (/,1X,
0320       *        "Enter number of readings to average per data point. _")
0321        READ (CRT,*) IRNUM
0322        IF (IRNUM .EQ. 9999) GO TO 9090
0323        IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0))  GO TO 6600
0324        WRITE (CRT,6509)
0325  6509  FORMAT (/,1X,"ERROR # WR15 - 17006 ......(WR15)",/,
0326       *         1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0327       *         1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0328        GO TO 6000
0329   6600 WRITE (CRT, 6609) I1, IRNUM
0330   6609 FORMAT (1A2,"a 52c 11Y",I5)
0331        GO TO 610
0332  C-----------------------------------------------------------------------
0333  C  Inquire from user:  number of scans per graph.
0334  C-----------------------------------------------------------------------
0335   7000 WRITE (CRT,7009)
0336   7009 FORMAT (/,1X,"Enter number of scans between graphs on screen. _")
0337        READ (CRT,*) IPEND
0338        IF (IPEND .EQ. 9999) GO TO 9090
0339        IF (IPEND .GE. 0) GO TO 7500
0340          WRITE (CRT,7209)
0341   7209   FORMAT (/,1X,"ERROR # WR15 - 17007 ......(WR15)",/,
0342       *         1X,"NUMBER OF SCANS CAN NOT BE LESS THAN 0",/,
0343       *         1X,"REENTER NUMBER OF SCANS BETWEEN GRAPHS ON CRT.")
0344          GO TO 7000
0345   7500 WRITE (CRT,7509)
0346   7509 FORMAT (/,1X,"Enter '1' to plot on CRT or '0' to plot on ",
0347       *              "plotter. _")
0348        READ (CRT,*) IGRLOC
0349        IPFLAG = 1
0350        PLUNIT(1) = 4H-PLO
0351        PLUNIT(2) = 4HTTER
0352        IF (IGRLOC .NE. 1) GO TO 7550
0353          PLUNIT(1) = 4H - C
0354          PLUNIT(2) = 4HRT
0355   7550 IF (IPEND .NE. 0) GO TO 7600
0356          IPFLAG = 0
0357          PLUNIT(1) = 4HGRAP
0358          PLUNIT(2) = 4HHS
```

```
0359   7600 ISEND = 1
0360        WRITE (CRT, 7609) I1, IPEND, (PLUNIT(I),I=1,2)
0361   7609 FORMAT (1A2,"a 52c 12Y",I5,1X,2A4)
0362        GO TO 610
0363  C-------------------------------------------------------------------
0364  C  Set antennae to first position and create disc data file.
0365  C-------------------------------------------------------------------
0366  C  Find title for file.
0367   8000 WRITE (CRT,8009) (ITITL(I),I=1,40)
0368   8009 FORMAT (/,1X,
0369       *"Enter title of file or press 'RETURN' key for following title.",
0370       */,40A2,/)
0371  C  Blank out rest of 80 bytes of title.
0372        REG = EXEC (1,401B,ITITL,-80)
0373        IF (IREG(2) .EQ. 0) GO TO 8100
0374        IF (IREG(2) .GT. 78) GO TO 8060
0375        DO 8050 I = (IREG(2)+3)/2,40
0376   8050 ITITL(I) = 2H
0377   8060 IF ((IREG(2)/2)*2 .EQ. IREG(2)) GO TO 8100
0378        ITITL(IREG(2)/2+1) = (ITITL(IREG(2)/2+1)/256)*256 + 32
0379  C  Set azimuth to -(1/2 of scan).
0380   8100 POSITN = PRESAZ-ASTEPS*(IAEND-1)/2
0381        PARAM = POSITN
0382        CALL WR6(PARAM,IERR,2,0)
0383        IF (IERR .EQ.0) GO TO 8200
0384          CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0385          GO TO 620
0386  C  Record size = 3 double words * (steps in scan + 1).
0387   8200 ISIZE(2) = 6 * (IAEND + 1)
0388  C  Minimum record size = 128.
0389        IF (ISIZE(2) .LT. 128) ISIZE(2) = 128
0390  C  File size = record size * (elevation steps * frequency steps + 1).
0391        ISIZE(1) = (ISIZE(2) * (IEEND * IFEND + 1) + 127)/128
0392   8300 NAMEF(3) = NAMEF(3) + 1
0393        CALL CREAT (IDCB,IERR,NAMEF,ISIZE,2)
0394        IF (IERR .GE. 0) GO TO 8450
0395        IF (IERR .EQ. -2) GO TO 8300
0396        WRITE (CRT,8409) IERR
0397   8409 FORMAT (/,1X,"ERROR #",I3," OCCURED IN SUBROUTINE CREAT")
0398        GO TO 9090
0399   8450 IF (PRNT .EQ. 0) GO TO 8500
0400  C  Print title and menu on line printer.
0401        WRITE (PRNT,8459) (ITITL(I),I=1,40),(NAMEF(I),I=1,3)
0402   8459 FORMAT ("1",40A2,/,1X,"FILE = ",3A2)
0403        WRITE (PRNT,600) IAEND,ASTEPS,IEEND,ESTEPS,RFREQ,PRESAZ,PRESEL,
0404       *                 IRNUM,IPEND,PLUNIT,PRNTL,IFEND,FSTEPS
0405   8500 WRITE (CRT,8509) NAMEF
0406   8509 FORMAT (/,1X,"NAME OF DATA FILE IS ",3A2)
0407  C  Put specifications in first record.
0408        CALL FTIME(IFAT)
0409        DO 8550 I=1,40
0410   8550 IFAT(15+I) = ITITL(I)
0411        IFAT(56) = 2HEL
0412        IFAT(57) = 0
0413        IFAT(58) = IAEND
0414        FAT(30) = ASTEPS
0415        IFAT(61) = 0
0416        IFAT(62) = IEEND
0417        FAT(32) = ESTEPS
0418        FAT(33) = RFREQ
```

```
0419         IFAT(67) = ISIZE(1)
0420         IFAT(68) = ISIZE(2)
0421         IFAT(69) = 0
0422         IFAT(70) = IFEND
0423         FAT(36) = FSTEPS
0424         ILFLAG = 1
0425         CALL WRITF (IDCB, IERR, FAT)
0426         IF (IERR .EQ. 0) GO TO 8700
0427           WRITE (CRT,8609) IERR
0428  8609     FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0429           GO TO 9090
0430  C-------------------------------------------------------------------
0431  C Elevation scan from PRESEL to PRESEL+ESTEPS*(IEEND-1) or until graph needed
0432  C-------------------------------------------------------------------
0433   8700 IF (IPEND .EQ. 0) ISEND = IEEND
0434         ID = 1
0435         IDRCT = 1
0436   8701 DO 8900 J=1,ISEND
0437         IF (J + IDONE .EQ. 1) GO TO 8720
0438  C  If not first scan, switch direction and increment elevation.
0439           IDRCT = -IDRCT
0440           PRESEL = PRESEL + ESTEPS
0441           PARAM = PRESEL
0442           CALL WR6 (PARAM, IERR, 4, 1)
0443           IF (IERR .EQ. 0) GO TO 8720
0444             CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0445             GO TO 9090
0446   8720 CALL WR1 (CRT, LUEL, TRUEL, IERR, 0)
0447         IF (IERR .EQ. 0) GO TO 8725
0448           CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0449           GO TO 9090
0450  C-------------------------------------------------------------------
0451  C  Azimuth scan from PRESAZ-ASTEPS*(IAEND-1)/2 to PRESAZ+ASTEPS*(IAEND-1)/2
0452  C-------------------------------------------------------------------
0453   8725 DO 8800 I=1,IAEND
0454  C  If break flag set, go back to menu.
0455         IF (IFBRK(IERR)) 523,8730
0456   8730 CALL WR1 (CRT, LUAZ, TRUAZ, IERR, 0)
0457         IF (IERR .EQ. 0) GO TO 8735
0458           CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0459           GO TO 9090
0460  C  Zero x and y before starting measurement for this position.
0461   8735 DO 8740 IL = ID, ID + (IFEND - 1) * (IAND + 1), IAEND + 1
0462           DAT(2, IL) = 0.
0463           DAT(3, IL) = 0.
0464   8740 CONTINUE
0465  C  Loop for statistical averaging.
0466         DO 8750 K = 1,IRNUM
0467  C  Do frequency scan
0468           DO 8750 L = 0, IFEND - 1
0469             IL = ID + L * (IAEND + 1)
0470             F = RFREQ + L * FSTEPS
0471             CALL CALF2(3, MC, F)
0472             CALL MESUR (F, X1, Y1, X, Y)
0473             CALL CORCT (MC, X1, Y1, X, Y)
0474             DAT(3, IL) = DAT(3, IL) + Y
0475   8750      DAT(2, IL) = DAT(2, IL) + X
0476         DO 8790 L = 0, IFEND - 1
0477           IL = ID + L * (IAEND + 1)
0478           X = DAT(2, IL) / IRNUM
```

```
0479          Y = DAT(3, IL) / IRNUM
0480          DAT(3, IL) = ATAN2(Y, X) * 180. / 3.141593
0481          DAT(2, IL) = -10 * ALOGT(X*X + Y*Y)
0482          IF (ILFLAG .EQ.0) GO TO 8780
0483            F = RFREQ + L * FSTEPS
0484            WRITE (CRT,8779) F, TRUAZ, DAT(2, IL), DAT(3, IL)
0485   8779 FORMAT (1X,"FREQ =",F6.0,5X,"AZIMUTH =",F8.3,5X,
0486       *         "RLOSS =",F9.4,5X,"PHASE =",F8.3)
0487   8780 DAT(1, IL) = TRUAZ
0488   8790 CONTINUE
0489        IF (I .GE. IAEND) GO TO 8800
0490          ID = ID + IDRCT
0491          POSITN = POSITN + IDRCT * ASTEPS
0492          PARAM = POSITN
0493          CALL WR6(PARAM,IERR,2,0)
0494          IF (IERR .EQ.0) GO TO 8800
0495            CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0496            GO TO 9090
0497   8800 CONTINUE
0498  C-------------------------------------------------------------------
0499  C  End of azimiuth scan loop.
0500  C-------------------------------------------------------------------
0501        IF (PRNT .EQ. 0) GO TO 8830
0502          WRITE (PRNT,8829) TRUEL
0503   8829 FORMAT (//,5X,"ELEVATION =",F8.3)
0504   8830   DO 8890 L = 1, IFEND
0505          ILB = 1 + (L -1) * (IAEND + 1)
0506          ILE = L * (IAEND + 1)
0507          DAT(1,ILE) = TRUEL
0508          DAT(2,ILE) = RFREQ + (L - 1) * FSTEPS
0509        IF (PRNT .EQ. 0) GO TO 8850
0510          DO 8840 IE = ILB,ILE - 1
0511   8840     WRITE (PRNT, 8849) DAT(2,ILE), (DAT(I,IE),I=1,3)
0512   8849 FORMAT (1X,"FREQ =",F6.0,5X,"AZIM =",F8.3,
0513       *         5X,"RLOSS =",F8.3,5X,"PHASE =",F8.3)
0514   8850 CALL WRITF (IDCB,IERR,DAT(1,ILB))
0515        IF (IERR .EQ. 0) GO TO 8890
0516          WRITE (CRT,8859) IERR
0517   8859   FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0518          GO TO 9090
0519   8890 CONTINUE
0520   8900 CONTINUE
0521  C-------------------------------------------------------------------
0522  C  End of elevation scan loop
0523  C-------------------------------------------------------------------
0524        IDONE = IDONE + ISEND
0525  C  If no scans, go to reset origianl position.
0526        IF (IPFLAG .LT. 1) GO TO 515
0527  C-------------------------------------------------------------------
0528  C  Call EXEC to overlay this segment with WR15G
0529  C-------------------------------------------------------------------
0530   8990 IF (IGRLOC .EQ. 1) GO TO 8995
0531        INAME(3) = 2HG
0532        GO TO 8998
0533   8995 INAME(3) = 2HT
0534   8998 CALL EXEC (ICODE,INAME)
0535   9000 WRITE (CRT,9009)
0536   9009 FORMAT (2/,1X,"Run program AGS02 for new calibration.")
0537   9090 WRITE (CRT,9099)
0538  09099 FORMAT (/,10X,
```

```
      *"**********  PROGRAM WR15 TERMINATED  **********")
       CALL CLOSE (IDCB)
       END
C-------------------------------------------------------------------------
C  Subroutine SETPO calls WR6 to set an azimuth or elevation position
C  and then calls WR1 to check the position.  If it is within .002 it
C  returns, if not it calls WR6 once again.
C-------------------------------------------------------------------------
       SUBROUTINE SETPO(CRT,LU,PRES,UNIT,IERR)
       DO 100 I = 1,2
         PARAM = PRES
         CALL WR6 (PARAM,IERR,UNIT,0)
         IF (IERR .NE. 0) RETURN
         IF (I .GT. 1) RETURN
C        IF (LU .EQ. 33) GO TO 90
         CALL WR1 (CRT,LU,NEW,IERR,0)
C        GO TO 91
C  90    CALL WR3 (CRT,LU,NEW,IERR,0)
   91    IF (IERR .NE. 0) RETURN
         IF (ABS(NEW-PRES) .LT. .002) RETURN
  100  CONTINUE
       RETURN
       END
       END$
```

```
&WR15G T=00004 IS ON CR00002 USING 00085 BLKS R=0526

0001  FTN4,L
0002  C      ***********************************************************************
0003  C      *                                                                     *
0004  C      *            SEGMENT:  WR15G                                          *
0005  C      *                                                                     *
0006  C      *            ++++++++++++++++++++++++++++++++++++++++                 *
0007  C      *      FOR:  Walter Reed Army Institute of Research                   *
0008  C      *            Department of Microwave Research                         *
0009  C      *            Walter Reed Army Medical Center                          *
0010  C      *            Washington, DC 20112                                     *
0011  C      *                                                                     *
0012  C      *            ++++++++++++++++++++++++++++++++++++++++                 *
0013  C      *                                                                     *
0014  C      *       BY:  Technology USA, Inc.                                     *
0015  C      *            P.O. Box 55333                                           *
0016  C      *            Fort Washington, Maryland 20744                          *
0017  C      *            Phone: (301) 292-2592                                    *
0018  C      *                                                                     *
0019  C      *  -------------------------------------------------------------      *
0020  C      *     Segment WR15G is the segment of WR15 that plots a               *
0021  C      *  graph on the plotter.  It is read in and control passed            *
0022  C      *  to it by an EXEC(8,WR15G) call from segment WR15C after            *
0023  C      *  a scan is finished.  WR15G then plots a graph on the               *
0024  C      *  plotter of the attenuation versus position for each                *
0025  C      *  frequency with a marker equal to the frequency number.             *
0026  C      *  When this segment is finished, it calls EXEC(8,WR15C) to           *
0027  C      *  read in WR15C and pass control to it.                              *
0028  C      *                                                                     *
0029  C      ***********************************************************************
0030        PROGRAM WR15G,5
0031  C
0032        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0033       *          ISIZE(2),ITITL(40),PLUNIT(2)
0034        INTEGER STATUS, ALPHLU,  GOUTLU, CRT, PRNT
0035        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0036       *       IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IREND,PRESRO,IDCB,NAMEF,
0037       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0038       *       PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0039        DATA ALPHLU, GOUTLU /1,19/
0040  C
0041  C  STATUS  -  Set to zero if no errors occur in a called routine
0042  C  ALPHLU  -  The LU of the alphanumeric device
0043  C  GOUTLU  -  The LU of the graphics output device
0044  C
0045  C***********************************************************************
0046  C
0047  C---------------------------------------------------------------------
0048  C  Initialize DGL system
0049  C---------------------------------------------------------------------
0050        WRITE(CRT,520)
0051   0520 FORMAT("")
0052        CALL ZBEGN
0053  C---------------------------------------------------------------------
0054  C  Enable all devices, exit if any errors
0055  C---------------------------------------------------------------------
0056        CALL ENDEV (ALPHLU,GOUTLU,STATUS)
0057        IF (STATUS .NE. 0) GOTO 9990
0058  C---------------------------------------------------------------------
```

```
0059  C  Find minimum and maximum values.
0060  C-------------------------------------------------------------------
0061        XMIN = DAT(1,1)
0062        XMAX = DAT(1,IAEND)
0063        YMIN = 100000.
0064        YMAX = -100000.
0065        DO 5100 K = 0, IFEND - 1
0066        DO 5100 I=1+(IAEND+1)*K, IAEND+(IAEND+1)*K
0067        IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0068        IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)
0069   5100 CONTINUE
0070        IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0071        YMIN = INT (YMIN)
0072        GO TO 5400
0073   5300 YMIN = INT (YMIN - .999)
0074   5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0075        YMAX = INT (YMAX + .999)
0076        GO TO 5600
0077   5500 YMAX = INT (YMAX)
0078   5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0079        IF (ABS(XMIN) .NE. XMIN) GO TO 5700
0080         XMIN = INT (XMIN)
0081        GO TO 5800
0082   5700 XMIN = INT (XMIN - .999)
0083   5800 IF (ABS(XMAX) .NE. XMAX) GO TO 5900
0084        XMAX = INT (XMAX + .999)
0085        GO TO 5950
0086   5900 XMAX = INT (XMAX)
0087  C-------------------------------------------------------------------
0088  C  Perform the viewing transformation, exit if any errors
0089  C-------------------------------------------------------------------
0090   5950 CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0091        IF (STATUS .NE. 0) GOTO 9990
0092  C-------------------------------------------------------------------
0093  C  Draw axis and label, then plot.
0094  C-------------------------------------------------------------------
0095        CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND,IFEND)
0096        GO TO 9000
0097  C-------------------------------------------------------------------
0098  C  Disable logical devices
0099  C-------------------------------------------------------------------
0100  C6000    CALL ZNEWF
0101  C        CALL CLEAR
0102   6000    CALL ZAEN
0103           CALL ZDEND
0104           CALL ZEND
0105  C-------------------------------------------------------------------
0106  C  Call EXEC to overlay this segment with WR15C and execute it.
0107  C-------------------------------------------------------------------
0108   9000 INAME(3) = 2HC
0109        CALL EXEC (ICODE, INAME)
0110   9990 CONTINUE
0111  C
0112        CALL ZAEND
0113        CALL ZDEND
0114  C-------------------------------------------------------------------
0115  C  Disable DGL system
0116  C-------------------------------------------------------------------
0117        CALL ZEND
0118  C-------------------------------------------------------------------
```

```
0119  C  Terminate program
0120  C-----------------------------------------------------------------------
0121   9998 WRITE(CRT,9999)
0122   9999 FORMAT("")
0123        END
0124  C
0125  C***********************************************************************
0126  C                        ENDEV SUBROUTINE
0127  C
0128  C  PURPOSE:       This subroutine enables all logical devices used by
0129  C                 the program.
0130  C
0131  C  DESCRIPTION:   This subroutine enables the DGL work station.  The DGL
0132  C                 workstation contains alphanumeric and graphics output
0133  C                 devices.
0134  C
0135  C  CALLING SEQUENCE:  CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0136  C
0137  C  PARAMETERS:
0138  C                 ALPHLU:  [INTEGER]; Alphanumeric LU
0139  C                 GOUTLU:  [INTEGER]; Graphics output LU
0140  C                 STATUS:  [INTEGER]; Set to zero if no errors occur
0141  C                                     during initialization of the
0142  C                                     workstation.  It is set to the
0143  C                                     DGL error return value if an
0144  C                                     error is found.
0145  C
0146  C***********************************************************************
0147  C
0148        SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0149  C
0150        INTEGER ALPHLU, GOUTLU,  STATUS
0151        INTEGER CONTRL
0152  C-----------------------------------------------------------------------
0153  C  If an error occurs, write out an error message, and return.
0154  C
0155  C  Enable alphanumeric device
0156  C-----------------------------------------------------------------------
0157  C     CALL ZAINT (ALPHLU,STATUS)
0158  C     IF (STATUS .EQ. 0) GOTO 1000
0159  C       CALL ERRMS (ALPHLU,STATUS,6HZAINT )
0160  C1000 CONTINUE
0161  C-----------------------------------------------------------------------
0162  C  Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0163  C-----------------------------------------------------------------------
0164        CONTRL = 0
0165        CALL ZDINT (GOUTLU,CONTRL,STATUS)
0166          IF (STATUS .EQ. 0) GOTO 9999
0167          CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0168   9999 CONTINUE
0169  C-----------------------------------------------------------------------
0170  C Return to main program after all devices are properly enabled
0171  C-----------------------------------------------------------------------
0172        RETURN
0173        END
0174  C
0175  C***********************************************************************
0176  C
0177  C                          SUBROUTINE VIEWT
0178  C
```

```
0179  C  PURPOSE:        This subroutine performs the initial viewing
0180  C                  transformation.
0181  C
0182  C  DESCRIPTION:    This subroutine performs the viewing transformation in
0183  C                  the following steps:
0184  C
0185  C                   - Places the image on the largest possible area
0186  C                   - Sets the window to the desired range.
0187  C                   - Resets the viewport to leave room for labels
0188  C                   - Recomputes character size based on specified window
0189  C
0190  C  CALLING SEQUENCE:  CALL VIEWT
0191  C
0192  C  PARAMETERS:     NONE
0193  C
0194  C*************************************************************************
0195  C
0196        SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0197  C
0198        INTEGER IDUM, IERR
0199        REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0200        REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0201  C
0202  C  IDUM     -  Dummy var
0203  C  IERR     -  Error return (not used)
0204  C  AR       -  Holds aspect ratio
0205  C  VIEW     -  Holds current viewport bounds
0206  C  XSIZE    -  Temp work variable
0207  C  YSIZE    -  Temp work variable
0208  C  XCSIZ    -  Temp holder of character size X
0209  C  XCSIZ    -  Temp holder of character size Y
0210  C  WXMIN    -  Temp holder of window X - min
0211  C  WXMAX    -  Temp holder of window X - max
0212  C  WYMIN    -  Temp holder of window Y - min
0213  C  WYMAX    -  Temp holder of window Y - max
0214  C  MINX     -  Temp holder of new viewport X - min
0215  C  MAXX     -  Temp holder of new viewport X - max
0216  C  MINY     -  Temp holder of new viewport Y - min
0217  C  MAXY     -  Temp holder of new viewport Y - max
0218  C
0219  C*************************************************************************
0220  C
0221  C  Inquire aspect ratio of logical display limits
0222  C-------------------------------------------------------------------------
0223        CALL ZIWS (254,0,2,IDUM,AR,IERR)
0224        IF (IERR .EQ. 0) GO TO 555
0225          CALL ERRMS (1,IERR,6HZIWS  )
0226          GO TO 9999
0227  C-------------------------------------------------------------------------
0228  C  Make the largest possible area of the logical display available
0229  C  for graphical output by setting the aspect ratio(AR).
0230  C-------------------------------------------------------------------------
0231    555 YSIZE = AR(2)
0232        XSIZE = 1.0
0233        CALL ZASPK (XSIZE,YSIZE)
0234  C-------------------------------------------------------------------------
0235  C  Specify the desired range of X and Y values of the window
0236  C-------------------------------------------------------------------------
0237        CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0238  C-------------------------------------------------------------------------
```

```
0239  C  Inquire current viewport limits
0240  C-------------------------------------------------------------------
0241        CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0242        IF (IERR .EQ. 0) GO TO 577
0243          CALL ERRMS (1,IERR,6HZIWS  )
0244          GO TO 9999
0245  C-------------------------------------------------------------------
0246  C  Calculate the lower left hand corner of the viewport and leave
0247  C  enough room for labels.  The viewport is reduced 12% on each side
0248  C  to give room for lables.  Set the new viewport
0249  C-------------------------------------------------------------------
0250    577 MINX = .12 * VIEW(2)
0251        MAXX = .88 * VIEW(2)
0252        MINY = .12 * VIEW(4)
0253        MAXY = .88 * VIEW(4)
0254        CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0255  C-------------------------------------------------------------------
0256  C  Now set the character size based on the size of the window
0257  C  The constants below produce a readable character size in the new
0258  C  window.
0259  C-------------------------------------------------------------------
0260        XCSIZ = .015 * (WXMAX - WXMIN)
0261        YCSIZ = .025 * (WYMAX - WYMIN)
0262        CALL ZCSIZ (XCSIZ,YCSIZ)
0263  C
0264    9999 RETURN
0265        END
0266  C*******************************************************************************
0267  C                          SUBROUTINE DRWDT
0268  C
0269  C  PURPOSE:       This subroutine draws the current graph.
0270  C
0271  C  DESCRIPTION:  This subroutine clears the alphanumeric and graphics
0272  C                displays.  It then draws the current graph.  Note
0273  C                that if the user has not changed any data values
0274  C                the default values will be used.
0275  C
0276  C  CALLING SEQUENCE:  CALL DRWDT
0277  C
0278  C  PARAMETERS:   NONE
0279  C
0280  C*******************************************************************************
0281  C
0282        SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND,IFEND)
0283        REAL DAT(3,520)
0284        DIMENSION ILIST(3),RLIST(2)
0285        INTEGER TEXT(12),OPCODE,RSIZE
0286  C
0287        REAL VIEW(4)
0288  C
0289  C  VIEW    -  Temp holder of viewport bounds
0290  C
0291  C*******************************************************************************
0292  C
0293  C  Clear the graphics and alphanumeric displays
0294  C-------------------------------------------------------------------
0295        CALL ZNEWF
0296        CALL CLEAR
0297  C-------------------------------------------------------------------
0298  C  Determine parameters for LAXES call.  Search thru data for YMAX.
```

```
0299  C-----------------------------------------------------------------------
0300  C-----------------------------------------------------------------------
0301        XTIC = (XMAX-XMIN)/10.0
0302        YTIC = (YMAX-YMIN) / 10.0
0303        XORG = XMIN
0304        YORG = YMIN
0305        XMJC = 1.0
0306        YMJC = 1.0
0307        TSIZE = .02
0308        CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0309  C-----------------------------------------------------------------------
0310  C  Plot the graph.
0311  C-----------------------------------------------------------------------
0312        DO 5500 K = 0,IFEND-1
0313        KM = MOD(K+10,19) + 1
0314        IK = (IAEND + 1) * K
0315        CALL ZMOVE(DAT(1,1+IK), DAT(2,1+IK))
0316        DATM = XMIN
0317        DO 5000 I=2+IK, IAEND+IK
0318        CALL ZDRAW(DAT(1,I),DAT(2,I))
0319        IF (DAT(1,I) .LT. DATM) GO TO 5000
0320        DATM = DATM + 5.
0321        CALL ZMARK(KM)
0322   5000 CONTINUE
0323   5500 CONTINUE
0324  C-----------------------------------------------------------------------
0325  C  Change the viewport to the maximum posible so text strings may be
0326  C  placed anywhere on the view surface.  Output the text strings, then
0327  C  reset the viewport.
0328  C-----------------------------------------------------------------------
0329    6000  CALL VPMAX (VIEW)
0330        TEXT(1) = 2HRe
0331        TEXT(2) = 2Hla
0332        TEXT(3) = 2Hti
0333        TEXT(4) = 2Hve
0334        TEXT(5) = 2H P
0335        TEXT(6) = 2Hos
0336        TEXT(7) = 2Hit
0337        TEXT(8) = 2Hio
0338        TEXT(9) = 2Hn
0339        TEXT(10) = 2H(m
0340        TEXT(11) = 2Hm)
0341        TEXT(12) = 6412B
0342        NMTEXT = 24
0343        XTEXT = XMIN + (XMAX - XMIN) * .3
0344        YTEXT = YMIN + (YMAX-YMIN)/21.0
0345  C
0346        CALL ZMOVE (XTEXT,YTEXT)
0347  C     OPCODE=1052
0348  C     ISIZE=1
0349  C     RSIZE=0
0350  C     ILIST(1)=6
0351  C     CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0352  C     IF (IERR .EQ. 0) GO TO 6010
0353  C       CALL ERRMS (1,IERR,6HZOESC )
0354    6010  CALL ZTEXT (NMTEXT,TEXT)
0355  C
0356  C     CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0357  C     IF (IERR .EQ. 0) GO TO 6020
0358  C       CALL ERRMS (1,IERR,6HZIESC )
```

```
0359  C         GO TO 9999
0360   6020   TEXT(1) = 2HAt
0361          TEXT(2) = 2Hte
0362          TEXT(3) = 2Hnu
0363          TEXT(4) = 2Hat
0364          TEXT(5) = 2Hio
0365          TEXT(6) = 2Hn
0366          TEXT(7) = 2H(d
0367          TEXT(8) = 2Hb)
0368          TEXT(9) = 6412B
0369          NMTEXT = 18
0370          XTEXT = XMIN + (XMAX -XMIN)/30.0
0371          YTEXT = YMIN + (YMAX-YMIN) * .3
0372          OPCODE = 250
0373          RLIST(1) = 0
0374          RLIST(2) = 1.
0375          ISIZE = 0
0376          RSIZE = 2
0377          CALL ZMOVE(XTEXT,YTEXT)
0378          CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0379          IF (IERR .EQ. 0) GO TO 6030
0380            CALL ERRMS (1,IERR,6HZOESC )
0381            GO TO 9999
0382   6030   CALL ZTEXT(NMTEXT,TEXT)
0383          OPCODE=250
0384          RLIST(1) = 1.
0385          RLIST(2) = 0
0386          ISIZE = 0
0387          RSIZE = 2
0388          CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0389          IF (IERR .EQ. 0) GO TO 6040
0390            CALL ERRMS (1,IERR,6HZOESC )
0391            GO TO 9999
0392  C
0393   6040   CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0394          CALL ZMCUR
0395  C
0396   9999   RETURN
0397          END
0398  C
0399  C*************************************************************************
0400  C                              SUBROUTINE ERRMS
0401  C
0402  C  PURPOSE:       To write out an error message.
0403  C
0404  C  DESCRIPTION:   This subroutine writes an error message to the alphanumeric
0405  C                 LU.  The error number and DGL subroutine name that the error
0406  C                 occured during is reported.
0407  C
0408  C  CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0409  C
0410  C  PARAMETERS:
0411  C                 ALPHLU:    [INTEGER];  The alphanumeric LU
0412  C
0413  C                 ERROR:     [INTEGER];  The error number of the error to
0414  C                                        reported
0415  C
0416  C                 SUBR:      [INTEGER];  An array containing the name of
0417  C                                        the subroutine where the error occured.
0418  C
```

```
0419  C*************************************************************************
0420  C
0421        SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0422        INTEGER ALPHLU,ERROR,SUBR(3)
0423  C
0424  C  Write out the error message
0425  C
0426        CALL ZMCUR
0427        WRITE(ALPHLU,100) ERROR, SUBR
0428      100 FORMAT(" Error ",I2," occured in subroutine ",3A2)
0429  C
0430        RETURN
0431        END
0432  C
0433  C*************************************************************************
0434  C                    SUBROUTINE CLEAR
0435  C
0436  C  PURPOSE:       To clear the alphanumeric display
0437  C
0438  C  DESCRIPTION:  This subroutine will clear the alphanumeric display
0439  C                of a HP 2647 or HP 2648 terminal.  If the display is
0440  C                not a HP 2647 or HP 2648 then the call has no effect.
0441  C
0442  C  CALLING SEQUENCE: CALL CLEAR
0443  C
0444  C  PARAMETERS:        NONE
0445  C
0446  C*************************************************************************
0447  C
0448        SUBROUTINE CLEAR
0449        INTEGER ILIST(7), STRING(2), IERR
0450        REAL DUMMY
0451  C
0452  C  ILIST   - Information list returned by ZIWS
0453  C  IERR    - Error information returned by ZIWS (not used here)
0454  C  DUMMY   - Real information returned by ZIWS (none in this case)
0455  C  STRING - Device-dependent commands that clear a 264X terminal
0456  C
0457        DATA STRING /15550B,              15512B/
0458  C                  /    \              /    \
0459  C               33B   +  150B         33B  +  112B
0460  C               esc        h          esc       J
0461  C               (home cursor)        (clear display)
0462  C
0463  C*************************************************************************
0464  C
0465  C  Inquire the status of the alphanumeric device:
0466  C  upon return, ILIST(4) = -1  ==> no alpha device,
0467  C                        =  0  ==> it is disabled,
0468  C                        =  1  ==> it is enabled.
0469  C  If it is not enabled, just return.
0470  C
0471        CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
0472        IF (IERR .EQ. 0) GO TO 7070
0473          CALL ERRMS (1,IERR,6HZIWS  )
0474          GO TO 9999
0475     7070 IF (ILIST(4) .NE. 1) GOTO 9999
0476  C
0477  C  Alpha device is enabled. Make sure it is '264X' type then clear.
0478  C
```

```
0479         IF (ILIST(1) .NE. 2H26) GOTO 9999
0480         IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
0481         CALL ZALPH (4,STRING)
0482   C
0483    9999 RETURN
0484         END
0485   C
0486   C*******************************************************************************
0487   C
0488   C                                SUBROUTINE VPMAX
0489   C
0490   C  PURPOSE:        Set the viewport to the maximum limits.
0491   C
0492   C  DESCRIPTION:    The current viewport is saved in VIEW.  The viewport
0493   C                  is then set to the maximum limits.
0494   C
0495   C  CALLING SEQUENCE:  CALL VPMAX (VIEW)
0496   C
0497   C  PARAMETERS:
0498   C                  VIEW:  [REAL ARRAY OF 4];  This array contains the
0499   C                                             viewport before it was
0500   C                                             maxumized.
0501   C
0502   C*******************************************************************************
0503   C
0504         SUBROUTINE VPMAX (VIEW)
0505         REAL VIEW(4)
0506   C
0507         INTEGER IDUM
0508         REAL AR(2), NEWX, NEWY
0509   C
0510   C  IDUM    - Dummy work variable
0511   C  AR      - Temp holder of the aspect ratio
0512   C  NEWX    - Temp work variable
0513   C  NEWY    - Temp work variable
0514   C
0515   C*******************************************************************************
0516   C
0517   C  Inquire current viewport and save it in array VIEW
0518   C
0519         CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0520         IF (IERR .EQ. 0) GO TO 8080
0521           CALL ERRMS (1,IERR,6HZIWS  )
0522           GO TO 9999
0523   C
0524   C  Inquire the maximum aspect ratio
0525   C
0526    8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0527   C
0528   C  Set viewport to maximum dimensions
0529   C
0530         NEWY = 1.
0531         NEWX = 1.
0532         IF (AR(2) .LE. 1.) NEWY = AR(2)
0533         IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0534         CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0535   C
0536    9999 RETURN
0537         END
0538         END$
```

```
&WR1ST T=00004 IS ON CR00002 USING 00084 BLKS R=0522

0001  FTN4,L
0002  C      ****************************************************************
0003  C      *                                                              *
0004  C      *            SEGMENT:  WR1ST                                   *
0005  C      *                                                              *
0006  C      *            ++++++++++++++++++++++++++++++++++++++            *
0007  C      *      FOR:  Walter Reed Army Institute of Research            *
0008  C      *            Department of Microwave Research                  *
0009  C      *            Walter Reed Army Medical Center                   *
0010  C      *            Washington, DC 20112                              *
0011  C      *                                                              *
0012  C      *            ++++++++++++++++++++++++++++++++++++++            *
0013  C      *                                                              *
0014  C      *       BY:  Technology USA, Inc.                              *
0015  C      *            P.O. Box 55333                                    *
0016  C      *            Fort Washington, Maryland 20744                   *
0017  C      *            Phone: (301) 292-2592                             *
0018  C      *                                                              *
0019  C      *  ------------------------------------------------------------*
0020  C      *     Segment WR1ST is the segment of WR1S that plots a        *
0021  C      *  graph on the terminal.  It is read in and control passed    *
0022  C      *  to it by an EXEC(8,WR1ST) call from segment WR1SC after     *
0023  C      *  a scan is finished.  WR1ST then displays a graph on the     *
0024  C      *  CRT of the attenuation versus position for each             *
0025  C      *  frequency, with a marker equal to the frequency number.     *
0026  C      *  frequency.  When this segment finishes, this graph is       *
0027  C      *  still displayed while the next scan is done and is erased   *
0028  C      *  before the next graph is plotted.  The last graph is        *
0029  C      *  displayed while the antennae are repositioned and then      *
0030  C      *  WR1SC turns off the graphic display without erasing it.     *
0031  C      *  The user can reenable the display by pressing the "SHIFT"   *
0032  C      *  and "G CURSOR" keys.  When this segment is finished, it     *
0033  C      *  calls EXEC(8,WR1SC) to read in WR1SC and pass control to    *
0034  C      *  it.                                                         *
0035  C      ****************************************************************
0036        PROGRAM WR1ST,5
0037  C
0038        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0039       *          ISIZE(2),ITITL(40),PLUNIT(2)
0040        INTEGER STATUS, GOUTLU, CRT, PRNT
0041        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0042       *       IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IREND,PRESRO,IDCB,NAMEF,
0043       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0044       *       PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0045        EQUIVALENCE (CRT, GOUTLU)
0046  C
0047  C  STATUS  -  Set to zero if no errors occur in a called routine
0048  C  GOUTLU  -  The LU of the graphics output device
0049  C
0050  C*****************************************************************************
0051  C
0052  C-----------------------------------------------------------------------
0053  C  Initialize DGL system
0054  C-----------------------------------------------------------------------
0055        WRITE(CRT,520)
0056   0520 FORMAT("")
0057        CALL ZBEGN
0058  C-----------------------------------------------------------------------
```

```
0059  C  Enable all devices, exit if any errors
0060  C-------------------------------------------------------------------
0061        CALL ENDEV (CRT,GOUTLU,STATUS)
0062        IF (STATUS .NE. 0) GOTO 9990
0063  C-------------------------------------------------------------------
0064  C  Find minimum and maximum values.
0065  C-------------------------------------------------------------------
0066        XMIN = DAT(1,1)
0067        XMAX = DAT(1,IAEND)
0068        YMIN = 100000.
0069        YMAX = -100000.
0070        DO 5100 K = 0, IFEND - 1
0071        DO 5100 I=1+(IAEND+1)*K, IAEND+(IAEND+1)*K
0072        IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0073        IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)
0074   5100 CONTINUE
0075        IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0076        YMIN = INT (YMIN)
0077        GO TO 5400
0078   5300 YMIN = INT (YMIN - .999)
0079   5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0080        YMAX = INT (YMAX + .999)
0081        GO TO 5600
0082   5500 YMAX = INT (YMAX)
0083   5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0084        IF (ABS(XMIN) .NE. XMIN) GO TO 5700
0085        XMIN = INT (XMIN)
0086        GO TO 5800
0087   5700 XMIN = INT (XMIN - .999)
0088   5800 IF (ABS(XMAX) .NE. XMAX) GO TO 5900
0089        XMAX = INT (XMAX + .999)
0090        GO TO 5950
0091   5900 XMAX = INT (XMAX)
0092  C-------------------------------------------------------------------
0093  C  Perform the viewing transformation, exit if any errors
0094  C-------------------------------------------------------------------
0095   5950 CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0096        IF (STATUS .NE. 0) GOTO 9990
0097  C-------------------------------------------------------------------
0098  C  Draw axis and label, then plot.
0099  C-------------------------------------------------------------------
0100        CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND,IFEND)
0101        GO TO 9000
0102  C-------------------------------------------------------------------
0103  C  Disable logical devices
0104  C-------------------------------------------------------------------
0105  C6000    CALL ZNEWF
0106  C        CALL CLEAR
0107   6000    CALL ZAEND
0108           CALL ZDEND
0109           CALL ZEND
0110  C-------------------------------------------------------------------
0111  C  Call EXEC to overlay this segment with WR15C and execute it.
0112  C-------------------------------------------------------------------
0113   9000 INAME(3) = 2HC
0114        CALL EXEC (ICODE, INAME)
0115   9990 CONTINUE
0116  C
0117        CALL ZAEND
0118        CALL ZDEND
```

```
0119  C-----------------------------------------------------------------------
0120  C  Disable DGL system
0121  C-----------------------------------------------------------------------
0122        CALL ZEND
0123  C-----------------------------------------------------------------------
0124  C  Terminate program
0125  C-----------------------------------------------------------------------
0126   9998 WRITE(CRT,9999)
0127   9999 FORMAT("")
0128        END
0129  C
0130  C*************************************************************************
0131  C                        ENDEV SUBROUTINE
0132  C
0133  C  PURPOSE:       This subroutine enables all logical devices used by
0134  C                  the program.
0135  C
0136  C  DESCRIPTION:   This subroutine enables the DGL work station.  The DGL
0137  C                  workstation contains alphanumeric and graphics output
0138  C                  devices.
0139  C
0140  C  CALLING SEQUENCE:  CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0141  C
0142  C  PARAMETERS:
0143  C                  ALPHLU:   [INTEGER]; Alphanumeric LU
0144  C                  GOUTLU:   [INTEGER]; Graphics output LU
0145  C                  STATUS:   [INTEGER]; Set to zero if no errors occur
0146  C                                       during initialization of the
0147  C                                       workstation.  It is set to the
0148  C                                       DGL error return value if an
0149  C                                       error is found.
0150  C
0151  C*************************************************************************
0152  C
0153        SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0154  C
0155        INTEGER ALPHLU, GOUTLU,  STATUS
0156        INTEGER CONTRL
0157  C-----------------------------------------------------------------------
0158  C  If an error occurs, write out an error message, and return.
0159  C
0160  C  Enable alphanumeric device
0161  C-----------------------------------------------------------------------
0162        CALL ZAINT (ALPHLU,STATUS)
0163        IF (STATUS .EQ. 0) GOTO 1000
0164          CALL ERRMS (ALPHLU,STATUS,6HZAINT )
0165   1000 CONTINUE
0166  C-----------------------------------------------------------------------
0167  C  Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0168  C-----------------------------------------------------------------------
0169        CONTRL = 0
0170        CALL ZDINT (GOUTLU,CONTRL,STATUS)
0171          IF (STATUS .EQ. 0) GOTO 9999
0172          CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0173   9999 CONTINUE
0174  C-----------------------------------------------------------------------
0175  C Return to main program after all devices are properly enabled
0176  C-----------------------------------------------------------------------
0177        RETURN
0178        END
```

```
0179  C
0180  C*************************************************************************
0181  C
0182  C                          SUBROUTINE VIEWT
0183  C
0184  C  PURPOSE:        This subroutine performs the initial viewing
0185  C                  transformation.
0186  C
0187  C  DESCRIPTION:    This subroutine performs the viewing transformation in
0188  C                  the following steps:
0189  C
0190  C                   - Places the image on the largest possible area
0191  C                   - Sets the window to the desired range.
0192  C                   - Resets the viewport to leave room for labels
0193  C                   - Recomputes character size based on specified window
0194  C
0195  C  CALLING SEQUENCE:  CALL VIEWT
0196  C
0197  C  PARAMETERS:     NONE
0198  C
0199  C*************************************************************************
0200  C
0201        SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0202  C
0203        INTEGER IDUM, IERR
0204        REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0205        REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0206  C
0207  C  IDUM     -  Dummy var
0208  C  IERR     -  Error return (not used)
0209  C  AR       -  Holds aspect ratio
0210  C  VIEW     -  Holds current viewport bounds
0211  C  XSIZE    -  Temp work variable
0212  C  YSIZE    -  Temp work variable
0213  C  XCSIZ    -  Temp holder of character size X
0214  C  XCSIZ    -  Temp holder of character size Y
0215  C  WXMIN    -  Temp holder of window X - min
0216  C  WXMAX    -  Temp holder of window X - max
0217  C  WYMIN    -  Temp holder of window Y - min
0218  C  WYMAX    -  Temp holder of window Y - max
0219  C  MINX     -  Temp holder of new viewport X - min
0220  C  MAXX     -  Temp holder of new viewport X - max
0221  C  MINY     -  Temp holder of new viewport Y - min
0222  C  MAXY     -  Temp holder of new viewport Y - max
0223  C
0224  C*************************************************************************
0225  C
0226  C  Inquire aspect ratio of logical display limits
0227  C-------------------------------------------------------------------------
0228        CALL ZIWS (254,0,2,IDUM,AR,IERR)
0229        IF (IERR .EQ. 0) GO TO 555
0230          CALL ERRMS (1,IERR,6HZIWS  )
0231          GO TO 9999
0232  C-------------------------------------------------------------------------
0233  C  Make the largest possible area of the logical display available
0234  C  for graphical output by setting the aspect ratio(AR).
0235  C-------------------------------------------------------------------------
0236    555 YSIZE = AR(2)
0237        XSIZE = 1.0
0238        CALL ZASPK (XSIZE,YSIZE)
```

```
0239  C-----------------------------------------------------------------------
0240  C  Specify the desired range of X and Y values of the window
0241  C-----------------------------------------------------------------------
0242        CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0243  C-----------------------------------------------------------------------
0244  C  Inquire current viewport limits
0245  C-----------------------------------------------------------------------
0246        CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0247        IF (IERR .EQ. 0) GO TO 577
0248          CALL ERRMS (1,IERR,6HZIWS  )
0249          GO TO 9999
0250  C-----------------------------------------------------------------------
0251  C  Calculate the lower left hand corner of the viewport and leave
0252  C  enough room for labels.  The viewport is reduced 12% on each side
0253  C  to give room for lables.  Set the new viewport
0254  C-----------------------------------------------------------------------
0255    577 MINX = .12 * VIEW(2)
0256        MAXX = .88 * VIEW(2)
0257        MINY = .12 * VIEW(4)
0258        MAXY = .88 * VIEW(4)
0259        CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0260  C-----------------------------------------------------------------------
0261  C  Now set the character size based on the size of the window
0262  C  The constants below produce a readable character size in the new
0263  C  window.
0264  C-----------------------------------------------------------------------
0265        XCSIZ = .015 * (WXMAX - WXMIN)
0266        YCSIZ = .025 * (WYMAX - WYMIN)
0267        CALL ZCSIZ (XCSIZ,YCSIZ)
0268  C
0269   9999 RETURN
0270        END
0271  C*************************************************************************
0272  C                          SUBROUTINE DRWDT
0273  C
0274  C  PURPOSE:       This subroutine draws the current graph.
0275  C
0276  C  DESCRIPTION:  This subroutine clears the alphanumeric and graphics
0277  C                displays.  It then draws the current graph.  Note
0278  C                that if the user has not changed any data values
0279  C                the default values will be used.
0280  C
0281  C  CALLING SEQUENCE:  CALL DRWDT
0282  C
0283  C  PARAMETERS:   NONE
0284  C
0285  C*************************************************************************
0286  C
0287        SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND,IFEND)
0288        REAL DAT(3,520)
0289        DIMENSION ILIST(3)
0290        INTEGER TEXT(12),OPCODE,RSIZE
0291  C
0292        REAL VIEW(4)
0293  C
0294  C  VIEW    -  Temp holder of viewport bounds
0295  C
0296  C*************************************************************************
0297  C
0298  C  Clear the graphics and alphanumeric displays
```

```
0299  C------------------------------
0300        CALL ZNEWF
0301        CALL CLEAR
0302  C------------------------------
0303  C  Determine parameters for LAX
0304  C------------------------------
0305  C------------------------------
0306        XTIC = (XMAX-XMIN)/10.0
0307        YTIC = (YMAX-YMIN) / 10.0
0308        XORG = XMIN
0309        YORG = YMIN
0310        XMJC = 1.0
0311        YMJC = 1.0
0312        TSIZE = .02
0313        CALL LAXES(XTIC,YTIC,XORG
0314  C------------------------------
0315  C  Plot the graph.
0316  C------------------------------
0317        DO 5500 K = 0, IFEND - 1
0318        KM = MOD(K+10,19) + 1
0319        IK = (IAEND + 1) * K
0320        CALL ZMOVE(DAT(1,1+IK),DA
0321        DATM = XMIN
0322        DO 5000 I=2+IK, IAEND+IK
0323        CALL ZDRAW(DAT(1,I),DAT(2
0324        IF (DAT(1,I) .LT. DATM) G
0325          DATM = DATM + 5.
0326          CALL ZMARK(KM)
0327   5000 CONTINUE
0328   5500 CONTINUE
0329  C------------------------------
0330  C  Change the viewport to the r
0331  C  placed anywhere on the view
0332  C  reset the viewport.
0333  C------------------------------
```

```
0342          TEXT(8) = 2H10
0343          TEXT(9) = 2Hn
0344          TEXT(10) = 2H(m
0345          TEXT(11) = 2Hm)
0346          TEXT(12) = 6412B
0347          NMTEXT = 24
0348          XTEXT = 0.0
0349          YTEXT = YMIN + (YMAX-YM
0350  C
0351          CALL ZMOVE (XTEXT,YTEXT
0352          OPCODE=1052
0353          ISIZE=1
0354          RSIZE=0
0355          IL1ST(1)=6
0356          CALL ZOESC(OPCODE,ISIZE
0357          IF (IERR .EQ. 0) GO TO
0358            CALL ERRMS (1,IERR,6H
```

```
0359   6010  CALL ZTEXT (NMTEXT,TEXT)
0360   C
0361   C       CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0362   C       IF (IERR .EQ. 0) GO TO 6020
0363   C         CALL ERRMS (1,IERR,6HZIESC )
0364   C         GO TO 9999
0365   6020  TEXT(1) = 2HAt
0366         TEXT(2) = 2Hte
0367         TEXT(3) = 2Hnu
0368         TEXT(4) = 2Hat
0369         TEXT(5) = 2Hio
0370         TEXT(6) = 2Hn
0371         TEXT(7) = 2H(d
0372         TEXT(8) = 2Hb)
0373         TEXT(9) = 6412B
0374         NMTEXT = 18
0375         XTEXT = XMIN + (XMAX -XMIN)/30.0
0376         YTEXT = YMIN + (YMAX-YMIN)/2.0
0377         OPCODE = 1050
0378         ILIST(1) = 1
0379         ISIZE = 1
0380         RSIZE = 0
0381         CALL ZMOVE(XTEXT,YTEXT)
0382         CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0383         IF (IERR .EQ. 0) GO TO 6030
0384           CALL ERRMS (1,IERR,6HZOESC )
0385           GO TO 9999
0386   6030  CALL ZTEXT(NMTEXT,TEXT)
0387         OPCODE=1050
0388         ILIST(1) = 0
0389         ISIZE = 1
0390         RSIZE = 0
0391         CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0392         IF (IERR .EQ. 0) GO TO 6040
0393           CALL ERRMS (1,IERR,6HZOESC )
0394           GO TO 9999
0395   C
0396   6040  CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0397         CALL ZMCUR
0398   C
0399   9999  RETURN
0400         END
0401   C
0402   C*************************************************************************
0403   C                              SUBROUTINE ERRMS
0404   C
0405   C  PURPOSE:       To write out an error message.
0406   C
0407   C  DESCRIPTION:   This subroutine writes an error message to the alphanumeric
0408   C                 LU.  The error number and DGL subroutine name that the error
0409   C                 occured during is reported.
0410   C
0411   C  CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0412   C
0413   C  PARAMETERS:
0414   C                 ALPHLU:    [INTEGER];  The alphanumeric LU
0415   C
0416   C                 ERROR:     [INTEGER];  The error number of the error to
0417   C                                        reported
0418   C
```

```
C                SUBR:     (INTEGER);  An array containing the name of
C                                      the subroutine where the error occured.
C
C*************************************************************************
C
      SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
      INTEGER ALPHLU,ERROR,SUBR(3)
C
C  Write out the error message
C
      CALL ZMCUR
      WRITE(ALPHLU,100) ERROR, SUBR
  100 FORMAT(" Error ",I2," occured in subroutine ",3A2)
C
      RETURN
      END
C
C*************************************************************************
C                   SUBROUTINE CLEAR
C
C  PURPOSE:       To clear the alphanumeric display
C
C  DESCRIPTION:   This subroutine will clear the alphanumeric display
C                 of a HP 2647 or HP 2648 terminal.  If the display is
C                 not a HP 2647 or HP 2648 then the call has no effect.
C
C  CALLING SEQUENCE: CALL CLEAR
C
C  PARAMETERS:        NONE
C
C*************************************************************************
C
      SUBROUTINE CLEAR
      INTEGER ILIST(7), STRING(2), IERR
      REAL DUMMY
C
C  ILIST  - Information list returned by ZIWS
C  IERR   - Error information returned by ZIWS (not used here)
C  DUMMY  - Real information returned by ZIWS (none in this case)
C  STRING - Device-dependent commands that clear a 264X terminal
C
      DATA STRING /15550B,              15512B/
C                  /    \              /    \
C              33B   +  150B         33B  +  112B
C              esc       h           esc       J
C              (home cursor)        (clear display)
C
C*************************************************************************
C
C  Inquire the status of the alphanumeric device:
C  upon return, ILIST(4) = -1  ==> no alpha device,
C                        =  0  ==> it is disabled,
C                        =  1  ==> it is enabled.
C  If it is not enabled, just return.
C
      CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
      IF (IERR .EQ. 0) GO TO 7070
        CALL ERRMS (1,IERR,6HZIWS  )
        GO TO 9999
 7070 IF (ILIST(4) .NE. 1) GOTO 9999
```

```
C
C  Alpha device is enabled. Make sure it is '264X' type then clear.
C
      IF (ILIST(1) .NE. 2H26) GOTO 9999
      IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
      CALL ZALPH (4,STRING)
C
 9999 RETURN
      END
C
C*******************************************************************************
C
C                              SUBROUTINE VPMAX
C
C  PURPOSE:        Set the viewport to the maximum limits.
C
C  DESCRIPTION:    The current viewport is saved in VIEW.  The viewport
C                  is then set to the maximum limits.
C
C  CALLING SEQUENCE:  CALL VPMAX (VIEW)
C
C  PARAMETERS:
C                  VIEW:  [REAL ARRAY OF 4];  This array contains the
C                                             viewport before it was
C                                             maxumized.
C
C*******************************************************************************
C
      SUBROUTINE VPMAX (VIEW)
      REAL VIEW(4)
C
      INTEGER IDUM
      REAL AR(2), NEWX, NEWY
C
C  IDUM    - Dummy work variable
C  AR      - Temp holder of the aspect ratio
C  NEWX    - Temp work variable
C  NEWY    - Temp work variable
C
C*******************************************************************************
C
C  Inquire current viewport and save it in array VIEW
C
      CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
      IF (IERR .EQ. 0) GO TO 8080
        CALL ERRMS (1,IERR,6HZIWS  )
        GO TO 9999
C
C  Inquire the maximum aspect ratio
C
 8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
C
C  Set viewport to maximum dimensions
C
      NEWY = 1.
      NEWX = 1.
      IF (AR(2) .LE. 1.) NEWY = AR(2)
      IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
      CALL ZVIEW (0.0,NEWX,0.0,NEWY)
C
```

```
0539    9999 RETURN
0540         END
0541         END$
```

```
&WR16M T=00004 IS ON CR32767 USING 00013 BLKS R=0086

0001  FTN4,L
0002  C 24998-18466 REV.2040 (810304.1057)
0003  C*************************************************************************
0004  C
0005  C                          PROGRAM WR16
0006  C
0007  C  DESCRIPTION:
0008  C   WR16 is designed to obtain microwave S11 measurements at different
0009  C   points along a raster scan and to store the data in a disc file.
0010  C   This program has been divided into four segments because it cannot
0011  C   fit into memory otherwise.  The main segment always remains in
0012  C   memory.  Segment WR16C is the control segment, which is the first
0013  C   one read in by the main segment.  The other two are WR15G, which
0014  C   plots on the plotter and WR15T, which plots on the terminal.
0015  C   WR16C gives the user a choice of where to plot for each run, so
0016  C   essentially, for each run there are only three segments.  The
0017  C   two segments beside the main overlay each other by one segment
0018  C   calling EXEC(8, other segment name) to read in the other
0019  C   segment over the calling segment and then pass control to it.
0020  C   It can return to the calling segment only by calling EXEC(8,
0021  C   other segment name) again.
0022  C   This segment is the main segment.  It is run by typing in:
0023  C                    RU,WR16
0024  C   This segment only defines common, initializes variables, and
0025  C   then calls EXEC(8,WR16C) to read in and pass control to segment
0026  C   WR16C.
0027  C
0028  C*************************************************************************
0029  C
0030        PROGRAM WR16
0031  C
0032        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0033       *          ISIZE(2),ITITL(40),PLUNIT(2)
0034        INTEGER CRT,PRNT
0035        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0036       *       IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESEL,IDCB,NAMEF,
0037       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0038       *       PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0039        COMMON/AGS2C/ D(10)
0040        IRNUM = 1
0041        CRT = 1
0042        IPRNM(1) = 1HW
0043        IPRNM(2) = 1HR
0044        IPRNM(3) = 1H1
0045        IPRNM(4) = 1H6
0046        IPRNL = 4
0047        MESS = -1
0048        ASTEPS = 5
0049        IAEND  = 4
0050        ESTEPS = 30
0051        IEEND  =  3
0052        IPEND = 1
0053        ISEND = 1
0054        IDONE = 0
0055        PRESAZ = 999.9
0056        IPFLAG = 1
0057        ILFLAG = 1
0058        PLUNIT(1) = 4H - C
```

```
0059          PLUNIT(2) = 4HRT
0060          IGRLOC = 1
0061          IFEND = 1
0062          NAMEF(1) = 2HSC
0063          NAMEF(2) = 2HS1
0064          NAMEF(3) = 2H1@
0065          PRNT = 6
0066          CALL FILE2(1)
0067          TEMP1 = D(1)
0068          TEMP2 = (D(3) - 1) * D(2) + D(1)
0069          RFREQ = D(1)
0070    C-------------------------------------------------------------------
0071    C  Call EXEC to read in segment WR16C and pass control to it.
0072    C-------------------------------------------------------------------
0073    C
0074          ICODE=8
0075          INAME(1)=2HWR
0076          INAME(2)=2H16
0077          INAME(3)=2HC
0078          CALL EXEC (ICODE, INAME)
0079          END
0080    C
0081    C  Block data routine for AGS2C
0082    C
0083          BLOCK DATA AGS2C
0084          COMMON /AGS2C/ I(2330)
0085          END
0086          END$
```

```
&WR16C T=00004 IS ON CR32767 USING 00097 BLKS R=0545

0001  FTN4,L
0002  C      ******************************************************************
0003  C      *                                                                *
0004  C      *            SEGMENT:  WR16C                                     *
0005  C      *                                                                *
0006  C      *            ++++++++++++++++++++++++++++++++++++++              *
0007  C      *      FOR:  Walter Reed Army Institute of Research              *
0008  C      *            Department of Microwave Research                    *
0009  C      *            Walter Reed Army Medical Center                     *
0010  C      *            Washington, DC 20112                                *
0011  C      *                                                                *
0012  C      *            ++++++++++++++++++++++++++++++++++++++              *
0013  C      *                                                                *
0014  C      *       BY:  Technology USA, Inc.                                *
0015  C      *            P.O. Box 55333                                      *
0016  C      *            Fort Washington, Maryland 20744                     *
0017  C      *            Phone: (301) 292-2592                               *
0018  C      *                                                                *
0019  C      *  ------------------------------------------------------------  *
0020  C      *     Segment WR16C is the control segment of WR16.  It puts     *
0021  C      *  out a menu with the options:                                  *
0022  C      *    1 - Enter the number of azimuth steps and step size.        *
0023  C      *    2 - Enter the number of elevation steps and step size.      *
0024  C      *    3 - Enter the microwave frequency.                          *
0025  C      *    4 - Set antennae to a new azimuth position.                 *
0026  C      *    5 - Set antennae to a new elevation position.               *
0027  C      *    6 - Enter number of readings to average for each point.     *
0028  C      *    7 - Request graphs on the CRT.                              *
0029  C      *   10 - List on the printer.                                    *
0030  C      *   11 - Enter number of frequency steps and step size.          *
0031  C      *    8 - Scan from the present position                          *
0032  C      *    9 - Terminate the program.                                  *
0033  C      *  After 8 is chosen, the antennae are positioned at the         *
0034  C      *  present position-(number of data points-1)*step size/2.       *
0035  C      *  The amplitude and phase are each averaged over the number     *
0036  C      *  of readings specified in 6 and saved in the array DAT         *
0037  C      *  along with the position.  Then the antennae are advanced      *
0038  C      *  by step size and the amplitude and phase are read again.      *
0039  C      *  This is repeated for the specified number of steps per        *
0040  C      *  scan.                                                         *
0041  C      *  After each scan, the data accumulated in array DAT is         *
0042  C      *  read out to a disc file, SCS11A.  If there is a file          *
0043  C      *  with that name already, the last letter is incremented.       *
0044  C      *  After the data is read out, elevation is incremented by       *
0045  C      *  elevation step size and the whole process repeated for        *
0046  C      *  the number of elevation steps.                                *
0047  C      *                                                                *
0048  C      ******************************************************************
0049        PROGRAM WR16C,5
0050        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0051       *          ISIZE(2),ITITL(40),IREG(2),IFAT(3120),PRNTL(2),
0052       *          PLUNIT(2),FAT(1560),INA15(3)
0053        INTEGER CRT,PRNT
0054        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0055       *       IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESEL,IDCB,NAMEF,
0056       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0057       *       PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0058        EQUIVALENCE (REG,IREG),(DAT,IFAT),(DAT,FAT)
```

```
0059  C
0060        COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,NONLY,
0061       *CM(4,112),IHEAD(40),IDATE(15)
0062        DATA LUAZ/31/,LUEL/35/,I1/15446B/,INA15/2HWR,2H15,2HT /
0063  C-----------------------------------------------------------------------
0064  C  Set number of scans if plots requested.
0065  C-----------------------------------------------------------------------
0066  C  If start of program, go to menu.
0067        IF (PRESAZ .EQ. 999.9) GO TO 525
0068  C  If graphing on screen, do not list data there.
0069        IF (IGRLOC .EQ. 1) ILFLAG = 0
0070  C  If finished with run, go reset position.
0071        IF (IDONE .GE. IEEND) GO TO 515
0072  C  If plotting every scan, go do next scan.
0073        IF (IPEND .EQ. 1) GO TO 8701
0074        IF (IDONE .NE. 1) GO TO 511
0075        IF (IPEND .GT. IEEND) GO TO 513
0076  C  Plotted first scan so now get back on schedule.
0077          ISEND = IPEND - 1
0078          GO TO 8701
0079    511 IF (IDONE+IPEND .GT. IEEND) GO TO 513
0080  C  Plot every specified scan.
0081          ISEND = IPEND
0082          GO TO 8701
0083  C  Scan to end of run without plotting.
0084    513   ISEND = IEEND - IDONE
0085          IPFLAG = -1
0086          GO TO 8701
0087  C-----------------------------------------------------------------------
0088  C  Reset original position.
0089  C-----------------------------------------------------------------------
0090    515 WRITE (CRT, 519)
0091   519  FORMAT (/,1X,"SCAN IS FINISHED",/,1X,
0092       *         "ANTENNAE ARE BEING RESET TO THEIR ORIGINAL POSITION",
0093       *        /,1X,"PLEASE EXCUSE THE DELAY")
0094        CALL SETPO (CRT, LUAZ, PRESAZ, 2, IERR)
0095        IF (IERR .EQ. 0) GO TO 522
0096          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0097          GO TO 9090
0098   522  PRESEL = PRESEL - ESTEPS*(IEEND-1)
0099        CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0100        IF (IERR .EQ. 0) GO TO 523
0101          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0102          GO TO 9090
0103  C  Reset parameters to original values.
0104    523 IF (IPFLAG .EQ. 0) GO TO 525
0105        ISEND = 1
0106        IPFLAG = 1
0107        ILFLAG = 1
0108   525  IDONE = 0
0109  C-----------------------------------------------------------------------
0110  C  Clear screen and print heading and menu.
0111  C-----------------------------------------------------------------------
0112        WRITE(CRT,529)
0113  0529  FORMAT(""
0114       *       10X,55'*',/,
0115       *10X,"*",20X,"PROGRAM  WR16",20X,"*",/,
0116       *10X,"*",15X,"S21 RASTER SCAN PROGRAM",15X,"*",/,
0117       *10X,55'*',/)
0118   530  CALL WR1 (CRT, LUAZ, PRESAZ, IERR, 0)
```

```
0119         IF (IERR .EQ. 0) GO TO 540
0120           CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0121           GO TO 9090
0122    540  CALL WR1 (CRT,LUEL,PRESEL,IERR,0)
0123         IF (IERR .EQ. 0) GO TO 550
0124           CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0125           GO TO 9090
0126     550 IF (PRNT .EQ. 0) GO TO 555
0127           PRNTL(1) = 4H PRI
0128           PRNTL(2) = 4HNT
0129           GO TO 560
0130     555   PRNTL(1) = 4HNO P
0131           PRNTL(2) = 4HRINT
0132    560  WRITE(CRT,600) IAEND,ASTEPS,IEEND,ESTEPS,RFREQ,PRESAZ,PRESEL,
0133        *IRNUM,IPEND,(PLUNIT(I),I=1,2),(PRNTL(I),I=1,2),IFEND,FSTEPS
0134    0600 FORMAT(" PROGRAM PARAMETER ENTRY",30X,"PRESENT VALUES",/,
0135        *"   1 - Number of azimuth steps and step size.....",
0136        *I3," x",F6.2," mm",/,
0137        *"   2 - Number of elevation steps and step size.....",
0138        *I3," x",F6.2," mm",/,
0139        *"   3 - Microwave frequency.....",
0140        *F7.0," MHz",/,
0141        *"   4 - Azimuth position.....",
0142        *F8.3," mm",/,
0143        *"   5 - Elevation position.....",
0144        *F8.3," mm",/,
0145        *"   6 - Number of readings to average per point.....",I5,/,
0146        *"   7 - Number of scans per graphs.....",I5,1X,2A4,/,
0147        *"  10 - Toggle switch for listing on printer.....",2X,2A4,/,
0148        *"  11 - Number of frequency steps and step size.....",
0149        *I3," x",F5.0," MHz",/,
0150        *" EXECUTION OPTIONS",/,
0151        *"   8 - Scan from the present position.",/,
0152        *"   9 - Terminate the program.",/"")
0153     610 WRITE (CRT,619)
0154    C  Clear old prompt with Esc h Esc J.
0155     0619 FORMAT ("")
0156      620 WRITE (CRT,629)
0157      629 FORMAT (1X,"SELECT OPTION NUMBER _")
0158          READ(CRT,*) IANS
0159          IF (IANS .EQ. 9999) GO TO 9090
0160          IF (IANS .EQ. 10) GO TO 700
0161          IF (IANS .EQ. 11) GO TO 800
0162          IF (IANS .EQ. 9) GO TO 9090
0163          IF (IANS .EQ. 8) GO TO 8000
0164          IF (IANS .EQ. 7) GO TO 7000
0165          IF (IANS .EQ. 6) GO TO 6000
0166          IF (IANS .EQ. 5) GO TO 5000
0167          IF (IANS .EQ. 4) GO TO 4000
0168          IF (IANS .EQ. 3) GO TO 3000
0169          IF (IANS .EQ. 2) GO TO 2000
0170          IF (IANS .EQ. 1) GO TO 1000
0171          WRITE (CRT,659)
0172      659 FORMAT (/,1X,"ERROR # WR16 - 20001 .....(WR16)",/,1X,
0173         *        "INCORRECT RESPONSE.  ENTER ANY NUMBER FROM 1 TO 11.")
0174          GO TO 620
0175    C-------------------------------------------------------------------
0176    C  Set to print on printer.
0177    C-------------------------------------------------------------------
0178      700 IF (PRNT .EQ. 6) GO TO 750
```

```
0179          PRNT = 6
0180          PRNTL(1) = 4H PRI
0181          PRNTL(2) = 4HNT
0182          GO TO 760
0183     750  PRNT = 0
0184          PRNTL(1) = 4HNO P
0185          PRNTL(2) = 4HRINT
0186     760  WRITE (CRT,769) I1,(PRNTL(I),I=1,2)
0187     769  FORMAT (1A2, "a 54c 13Y",2A4)
0188          GO TO 610
0189   C-------------------------------------------------------------------
0190   C  Inquire from user:  frequency step size and number of steps.
0191   C-------------------------------------------------------------------
0192     800  WRITE (CRT,809)
0193     809  FORMAT (/,1X,"Enter the number of frequency steps.  _")
0194          READ (CRT,*) IFEND
0195          IF (IFEND .EQ. 9999) GO TO 9090
0196          IF ((IFEND .GT. 0) .AND. (IFEND*(IAEND+1) .LE. 520)) GO TO 825
0197            WRITE (CRT,819)
0198     819  FORMAT (/,1X,"ERROR # WR16 - 20002 ......(WR16)",/,
0199        *  1X,"NUMBER OF STEPS MUST BE FROM 1 TO 520/(AZIMUTH STEPS + 1).",
0200        *          /,1X,"REENTER THE NUMBER OF FREQUENCY STEPS.")
0201            GO TO 800
0202     825  WRITE (CRT,829)
0203     829  FORMAT (/,1X,"Enter the frequency step size (MHz). _")
0204          READ (CRT,*) FSTEPS
0205          IF (FSTEPS .EQ. 9999) GO TO 9090
0206          IF ((RFREQ+(IFEND-1)*FSTEPS) .LE. TEMP2) GO TO 850
0207            WRITE (CRT,3509) TEMP1, TEMP2
0208            READ (CRT, 839) IANS
0209     839    FORMAT (A2)
0210            IF (IANS .EQ. 2HYE) GO TO 9000
0211            GO TO 800
0212     850  WRITE (CRT,859) I1, IFEND, FSTEPS
0213     859  FORMAT (1A2,"a 52c 14Y",I3," x",F5.0)
0214          GO TO 610
0215   C-------------------------------------------------------------------
0216   C  Inquire from the user:  azimuth step size and number of steps.
0217   C-------------------------------------------------------------------
0218   1000   WRITE(CRT,1100)
0219   1100   FORMAT(/," Enter the number of azimuth steps per scan.  _")
0220          READ(CRT,*) IAEND
0221          IF (IAEND .EQ. 9999) GO TO 9090
0222          IF ((IFEND*(IAEND+1) .LE. 520) .AND. (IAEND .GT. 0)) GO TO 1190
0223            WRITE (CRT,1109)
0224    1109    FORMAT (/,1X,"ERROR # WR16 - 20203 ......(WR16)",/,
0225         *1X,"NUMBER OF STEPS MUST BE FROM 1 TO 520/(FREQUENCY STEPS)-1.",/,
0226         *          1X,"REENTER THE NUMBER OF AZIMUTH STEPS.")
0227            GO TO 1000
0228   1190   WRITE(CRT,1200)
0229   1200   FORMAT(/," Enter the step size (mm).......  _")
0230          READ(CRT,*) ASTEPS
0231          IF (ASTEPS .EQ. 9999) GO TO 9090
0232          WRITE (CRT,1209) I1,IAEND,ASTEPS
0233    1209 FORMAT (1A2,"a 52c 6Y",I3," x",F6.2)
0234          GO TO 610
0235   C-------------------------------------------------------------------
0236   C  Inquire from user: elevation step size and number of steps.
0237   C-------------------------------------------------------------------
0238   2000   WRITE (CRT,2009)
```

```
0239  2009  FORMAT (/,1X,"Enter the number of elevation steps. _")
0240        READ (CRT,*) IEEND
0241        IF (IEEND .EQ. 9999) GO TO 9090
0242        IF (IEEND .GT. 0) GO TO 2028
0243          WRITE (CRT,2019)
0244   2019   FORMAT (/,1X,"ERROR # WR16 - 20404 ......(WR16)",/,
0245       *             1X,"THE NUMBER OF STEPS MUST BE GREATER THAN 0.",/,
0246       *             1X,"REENTER THE NUMBER OF ELEVATION STEPS.")
0247          GO TO 2000
0248   2028 WRITE (CRT,2029)
0249  2029  FORMAT (/,1X,"Enter the elevation step size (mm). _")
0250        READ (CRT,*) ESTEPS
0251        IF (ESTEPS .EQ.9999) GO TO 9090
0252        WRITE (CRT,2039) I1, IEEND, ESTEPS
0253   2039 FORMAT (1A2,"a 52c 7Y",I3," x",F6.2)
0254        GO TO 610
0255  C-----------------------------------------------------------------------
0256  C  Inquire from the user:  microwave frequency.
0257  C-----------------------------------------------------------------------
0258  3000  WRITE(CRT,3500)
0259  3500  FORMAT(/," Enter the RF frequency (MHz)...  _")
0260        READ(CRT,*)  RFREQ
0261        IF (RFREQ .EQ. 9999) GO TO 9090
0262        IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 3600
0263          WRITE (CRT,3509) TEMP1, TEMP2
0264  3509    FORMAT (/,1X,"ERROR # WR16 - 20005 ......(WR16)",/,1X,
0265       *           "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0266       *           /,1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0267       *           /,1X,"Do you wish to recalibrate?  (YES/NO) _")
0268          READ (CRT,3599) IANS
0269  3599    FORMAT (A2)
0270          IF (IANS .EQ. 2HYE) GO TO 9000
0271          GO TO 3000
0272   3600 WRITE (CRT, 3609) I1, RFREQ
0273   3609 FORMAT (1A2,"a 54c 8Y",F5.0)
0274        GO TO 610
0275  C-----------------------------------------------------------------------
0276  C  Inquire new azimuth position and call WR6 to set it.
0277  C-----------------------------------------------------------------------
0278  4000  WRITE (CRT,4090)
0279   4090 FORMAT (/,1X,"Enter new azimuth (mm).  _")
0280        READ (CRT,*) PRESAZ
0281        IF (PRESAZ .EQ. 9999) GO TO 9090
0282        CALL SETPO (CRT,LUAZ,PRESAZ,2,IERR)
0283        IF (IERR .EQ. 0) GO TO 4400
0284          CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0285          GO TO 620
0286   4400 WRITE (CRT,4409) I1,PRESAZ
0287   4409 FORMAT (1A2,"a 52c 9Y",F8.3)
0288        GO TO 610
0289  C-----------------------------------------------------------------------
0290  C  Inquire new elevation and call WR6 to set it.
0291  C-----------------------------------------------------------------------
0292  5000  WRITE (CRT,5090)
0293  5090  FORMAT (/,1X,"Enter new elevation _")
0294        READ (CRT,*) PRESEL
0295        IF (PRESEL .EQ. 9999) GO TO 9090
0296        CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0297        IF (IERR .EQ. 0) GO TO 5500
0298          CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
```

```
0299          GO TO 620
0300    5500 WRITE (CRT,5509) I1, PRESEL
0301    5509 FORMAT (1A2,"a 52c 10Y",F8.3)
0302         GO TO 610
0303   C-----------------------------------------------------------------------
0304   C  Inquire from the user: number of readings per data point.
0305   C-----------------------------------------------------------------------
0306   6000  WRITE (CRT,6009)
0307   6009  FORMAT (/,1X,
0308        *       "Enter number of readings to average per data point. _")
0309         READ (CRT,*) IRNUM
0310         IF (IRNUM .EQ. 9999) GO TO 9090
0311         IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0))  GO TO 6600
0312         WRITE (CRT,6509)
0313   6509  FORMAT (/,1X,"ERROR # WR16 - 20006 ......(WR16)",/,
0314        *         1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0315        *         1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0316         GO TO 6000
0317    6600 WRITE (CRT, 6609) I1, IRNUM
0318    6609 FORMAT (1A2,"a 52c 11Y",I5)
0319         GO TO 610
0320   C-----------------------------------------------------------------------
0321   C  Inquire from user:  number of scans per graph.
0322   C-----------------------------------------------------------------------
0323    7000 WRITE (CRT,7009)
0324    7009 FORMAT (/,1X,"Enter number of scans between graphs on screen. _")
0325         READ (CRT,*) IPEND
0326         IF (IPEND .EQ. 9999) GO TO 9090
0327         IF (IPEND .GE. 0) GO TO 7500
0328           WRITE (CRT,7209)
0329    7209   FORMAT (/,1X,"ERROR # WR16 - 20007 ......(WR16)",/,
0330        *         1X,"NUMBER OF SCANS CAN NOT BE LESS THAN 0",/,
0331        *         1X,"REENTER NUMBER OF SCANS BETWEEN GRAPHS ON CRT.")
0332           GO TO 7000
0333    7500 WRITE (CRT,7509)
0334    7509 FORMAT (/,1X,"Enter '1' to plot on CRT or '0' to plot on ",
0335        *                 "plotter. _")
0336         READ (CRT,*) IGRLOC
0337         IPFLAG = 1
0338         PLUNIT(1) = 4H-PLO
0339         PLUNIT(2) = 4HTTER
0340         IF (IGRLOC .NE. 1) GO TO 7550
0341           PLUNIT(1) = 4H - C
0342           PLUNIT(2) = 4HRT
0343    7550 IF (IPEND .NE. 0) GO TO 7600
0344           IPFLAG = 0
0345           PLUNIT(1) = 4HGRAP
0346           PLUNIT(2) = 4HHS
0347    7600 ISEND = 1
0348         WRITE (CRT, 7609) I1, IPEND, (PLUNIT(I),I=1,2)
0349    7609 FORMAT (1A2,"a 52c 12Y",I5,1X,2A4)
0350         GO TO 610
0351   C-----------------------------------------------------------------------
0352   C  Set antennae to first position and create disc data file.
0353   C-----------------------------------------------------------------------
0354   C  Find title for file.
0355    8000 WRITE (CRT,8009) (ITITL(I),I=1,40)
0356    8009 FORMAT (/,1X,
0357        *"Enter title of file or press 'RETURN' key for following title.",
0358        */,40A2,/)
```

```
0359  C  Blank out rest of 80 bytes of title.
0360        REG = EXEC (1,401B,ITITL,-80)
0361        IF (IREG(2) .EQ. 0) GO TO 8100
0362        IF (IREG(2) .GT. 78) GO TO 8060
0363        DO 8050 I = (IREG(2)+3)/2,40
0364   8050 ITITL(I) = 2H
0365   8060 IF ((IREG(2)/2)*2 .EQ. IREG(2)) GO TO 8100
0366        ITITL(IREG(2)/2+1) = (ITITL(IREG(2)/2+1)/256)*256 + 32
0367  C  Set azimuth to -(1/2 of scan).
0368   8100 POSITN = PRESAZ-ASTEPS*(IAEND-1)/2
0369        PARAM = POSITN
0370        CALL WR6(PARAM,IERR,2,0)
0371        IF (IERR .EQ.0) GO TO 8200
0372          CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0373          GO TO 620
0374   8200 D(3) = 1
0375  C  Record size = 3 double words * (steps in scan + 1).
0376        ISIZE(2) = 6 * (IAEND + 1)
0377  C  Minimum record size = 128.
0378        IF (ISIZE(2) .LT. 128) ISIZE(2) = 128
0379  C  File size = record size * (elevation steps * frequency steps + 1).
0380        ISIZE(1) = (ISIZE(2) * (IEEND * IFEND + 1) + 127)/128
0381   8300 NAMEF(3) = NAMEF(3) + 1
0382        CALL CREAT (IDCB,IERR,NAMEF,ISIZE,2)
0383        IF (IERR .GE. 0) GO TO 8450
0384        IF (IERR .EQ. -2) GO TO 8300
0385        WRITE (CRT,8409) IERR
0386   8409 FORMAT (/,1X,"ERROR #",I3," OCCURED IN SUBROUTINE CREAT")
0387        GO TO 9090
0388   8450 IF (PRNT .EQ. 0) GO TO 8500
0389  C  Print title and menu on line printer.
0390        WRITE (PRNT,8459) (ITITL(I),I=1,40),(NAMEF(I),I=1,3)
0391   8459 FORMAT ("1",40A2,/,1X,"FILE = ",3A2)
0392        WRITE (PRNT,600) IAEND,ASTEPS,IEEND,ESTEPS,RFREQ,PRESAZ,PRESEL,
0393       *                 IRNUM,IPEND,PLUNIT,PRNTL,IFEND,FSTEPS
0394   8500 WRITE (CRT,8509) NAMEF
0395   8509 FORMAT (/,1X,"NAME OF DATA FILE IS ",3A2)
0396  C  Put specifications in first record.
0397        CALL FTIME(IFAT)
0398        DO 8550 I=1,40
0399   8550 IFAT(15+I) = ITITL(I)
0400        IFAT(56) = 2HEL
0401        IFAT(57) = 0
0402        IFAT(58) = IAEND
0403        FAT(30) = ASTEPS
0404        IFAT(61) = 0
0405        IFAT(62) = IEEND
0406        FAT(32) = ESTEPS
0407        FAT(33) = RFREQ
0408        IFAT(67) = ISIZE(1)
0409        IFAT(68) = ISIZE(2)
0410        IFAT(69) = 0
0411        IFAT(70) = IFEND
0412        FAT(36) = FSTEPS
0413        ILFLAG = 1
0414        CALL WRITF (IDCB, IERR, FAT)
0415        IF (IERR .EQ. 0) GO TO 8700
0416          WRITE (CRT,8609) IERR
0417   8609   FORMAT (/,1X,"ERROR # ",13," OCCURED IN SUBROUTINE WRITF")
0418          GO TO 9090
```

```
0419  C-------------------------------------------------------------------
0420  C Elevation scan from PRESEL to PRESEL+ESTEPS*(IEEND-1) or until graph needed.
0421  C-------------------------------------------------------------------
0422   8700 IF (IPEND .EQ. 0) ISEND = IEEND
0423        ID = 1
0424        IDRCT = 1
0425   8701 DO 8900 J=1,ISEND
0426        IF (J + IDONE .EQ. 1) GO TO 8720
0427  C  If not first scan, switch direction and increment elevation.
0428          IDRCT = -IDRCT
0429          PRESEL = PRESEL + ESTEPS
0430          PARAM = PRESEL
0431          CALL WR6 (PARAM, IERR, 4, 1)
0432          IF (IERR .EQ. 0) GO TO 8720
0433            CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0434            GO TO 9090
0435   8720 CALL WR1 (CRT, LUEL, TRUEL, IERR, 0)
0436        IF (IERR .EQ. 0) GO TO 8725
0437          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0438          GO TO 9090
0439  C-------------------------------------------------------------------
0440  C  Azimuth scan from PRESAZ-ASTEPS*(IAEND-1)/2 to PRESAZ+ASTEPS*(IAEND-1)/2
0441  C-------------------------------------------------------------------
0442   8725 DO 8800 I=1,IAEND
0443  C  If break flag set, go back to menu.
0444        IF (IFBRK(IERR)) 523,8730
0445   8730 CALL WR1 (CRT, LUAZ, TRUAZ, IERR, 0)
0446        IF (IERR .EQ. 0) GO TO 8735
0447          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0448          GO TO 9090
0449  C  Do frequency scan at each position.
0450   8735 DO 8790 L=0,IFEND-1
0451          D(1) = RFREQ +L*FSTEPS
0452          YAVE = 0.
0453          XAVE = 0.
0454  C  Loop for statistical averaging.
0455        DO 8750 K = 1,IRNUM
0456          CALL CORS5(1,4,1)
0457            CALL CPOL2(CM(1,1),X,Y)
0458            YAVE = YAVE + Y
0459   8750     XAVE = XAVE + X
0460        XAVE = XAVE / IRNUM
0461        YAVE = YAVE / IRNUM
0462        RLOSS =-10*ALOGT(XAVE**2)
0463        IF (ILFLAG .EQ.0) GO TO 8780
0464        WRITE (CRT,8779) D(1),TRUAZ,RLOSS,YAVE
0465   8779 FORMAT (1X,"FREQ =",F6.0,5X,"AZIMUTH =",F8.3,5X,
0466       *         "RLOSS =",F9.4,5X,"PHASE =",F8.3)
0467   8780 IL = ID + L * (IAEND + 1)
0468        DAT(1,IL) = TRUAZ
0469        DAT(2,IL) = RLOSS
0470        DAT(3,IL) = YAVE
0471   8790 CONTINUE
0472        IF (I .GE. IAEND) GO TO 8800
0473        ID = ID + IDRCT
0474        POSITN = POSITN + IDRCT * ASTEPS
0475        PARAM = POSITN
0476        CALL WR6(PARAM,IERR,2,0)
0477        IF (IERR .EQ.0) GO TO 8800
0478          CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
```

```
0479          GO TO 9090
0480    8800 CONTINUE
0481   C-------------------------------------------------------------------
0482   C  End of azimiuth scan loop.
0483   C-------------------------------------------------------------------
0484         IF (PRNT .EQ. 0) GO TO 8830
0485           WRITE (PRNT,8829) TRUEL
0486    8829 FORMAT (//,5X,"ELEVATION =",F8.3)
0487    8830   DO 8890 L = 1, IFEND
0488           ILB = 1 + (L -1) * (IAEND + 1)
0489           ILE = L * (IAEND + 1)
0490           DAT(1,ILE) = TRUEL
0491           DAT(2,ILE) = RFREQ + (L - 1) * FSTEPS
0492         IF (PRNT .EQ. 0) GO TO 8850
0493           DO 8840 IE = ILB,ILE - 1
0494    8840     WRITE (PRNT, 8849) DAT(2,ILE), (DAT(I,IE),I=1,3)
0495    8849 FORMAT (1X,"FREQ =",F6.0,5X,"AZIM =",F8.3,
0496        *         5X,"RLOSS =",F8.3,5X,"PHASE =",F8.3)
0497    8850 CALL WRITF (IDCB,IERR,DAT(1,ILB))
0498         IF (IERR .EQ. 0) GO TO 8890
0499           WRITE (CRT,8859) IERR
0500    8859   FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0501           GO TO 9090
0502    8890 CONTINUE
0503    8900 CONTINUE
0504   C-------------------------------------------------------------------
0505   C  End of elevation scan loop
0506   C-------------------------------------------------------------------
0507         IDONE = IDONE + ISEND
0508   C  If no scans, go to reset original position.
0509         IF (IPFLAG .LT. 1) GO TO 515
0510   C-------------------------------------------------------------------
0511   C  Call EXEC to overlay this segment with WR16G
0512   C-------------------------------------------------------------------
0513    8990 IF (IGRLOC .EQ. 1) GO TO 8995
0514         INA15(3) = 2HG
0515         GO TO 8998
0516    8995 INA15(3) = 2HT
0517    8998 CALL EXEC (ICODE,INA15)
0518    9000 WRITE (CRT,9009)
0519    9009 FORMAT (2/,1X,"Run program AGS02 for new calibration.")
0520    9090 WRITE (CRT,9099)
0521   09099 FORMAT (/,10X,
0522        *"**********  PROGRAM WR16 TERMINATED  **********")
0523         CALL CLOSE (IDCB)
0524         END
0525   C-------------------------------------------------------------------
0526   C  Subroutine SETPO calls WR6 to set an azimuth or elevation position
0527   C  and then calls WR1 to check the position.  If it is within .002 it
0528   C  returns, if not it calls WR6 once again.
0529   C-------------------------------------------------------------------
0530         SUBROUTINE SETPO(CRT,LU,PRES,UNIT,IERR)
0531         DO 100 I = 1,2
0532           PARAM = PRES
0533           CALL WR6 (PARAM,IERR,UNIT,0)
0534           IF (IERR .NE. 0) RETURN
0535           IF (I .GT. 1) RETURN
0536   C       IF (LU .EQ. 33) GO TO 90
0537           CALL WR1 (CRT,LU,NEW,IERR,0)
0538   C       GO TO 91
```

```
0539  C  90    CALL WR3 (CRT,LU,NEW,IERR,0)
0540     91    IF (IERR .NE. 0) RETURN
0541           IF (ABS(NEW-PRES) .LT. .002) RETURN
0542    100 CONTINUE
0543        RETURN
0544        END
0545        END$
```

```
&WR17M T=00004 IS ON CR32767 USING 00013 BLKS R=0086

0001  FTN4,L
0002  C 24998-18466 REV.2040 (810304.1057)
0003  C*****************************************************************************
0004  C
0005  C                          PROGRAM WR17
0006  C
0007  C  DESCRIPTION:
0008  C   WR17 is designed to obtain microwave S11 measurements at different
0009  C   points along a raster scan and to store the data in a disc file.
0010  C   This program has been divided into four segments because it cannot
0011  C   fit into memory otherwise.  The main segment always remains in
0012  C   memory.  Segment WR17C is the control segment, which is the first
0013  C   one read in by the main segment.  The other two are WR15G, which
0014  C   plots on the plotter and WR15T, which plots on the terminal.
0015  C   WR17C gives the user a choice of where to plot for each run, so
0016  C   essentially, for each run there are only three segments.  The
0017  C   two segments beside the main overlay each other by one segment
0018  C   calling EXEC(8, other segment name) to read in the other
0019  C   segment over the calling segment and then pass control to it.
0020  C   It can return to the calling segment only by calling EXEC(8,
0021  C   other segment name) again.
0022  C   This segment is the main segment.  It is run by typing in:
0023  C                    RU,WR17
0024  C   This segment only defines common, initializes variables, and
0025  C   then calls EXEC(8,WR17C) to read in and pass control to segment
0026  C   WR17C.
0027  C
0028  C*****************************************************************************
0029  C
0030        PROGRAM WR17
0031  C
0032        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0033       *          ISIZE(2),ITITL(40),PLUNIT(2),IDUM(25)
0034        INTEGER CRT,PRNT
0035        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0036       *       IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESEL,IDCB,NAMEF,
0037       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0038       *       PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0039        COMMON/AGS2C/ D(10)
0040        IRNUM = 1
0041        CRT = 1
0042        IPRNM(1) = 1HW
0043        IPRNM(2) = 1HR
0044        IPRNM(3) = 1H1
0045        IPRNM(4) = 1H7
0046        IPRNL = 4
0047        MESS = -1
0048        ASTEPS = 5
0049        IAEND  = 4
0050        ESTEPS = 30
0051        IEEND  =  3
0052        IPEND = 1
0053        ISEND = 1
0054        IDONE = 0
0055        PRESAZ = 999.9
0056        IPFLAG = 1
0057        ILFLAG = 1
0058        PLUNIT(1) = 4H - C
```

```
0059          PLUNIT(2) = 4HRT
0060          IGRLOC = 1
0061          IFEND = 1
0062          NAMEF(1) = 2HSC
0063          NAMEF(2) = 2HS1
0064          NAMEF(3) = 2H1@
0065          PRNT = 6
0066          CALL FILE2(1)
0067          RFREQ = D(1)
0068          FSTEPS = D(2)
0069          IFEND = D(3)
0070    C-------------------------------------------------------------------
0071    C  Call EXEC to read in segment WR17C and pass control to it.
0072    C-------------------------------------------------------------------
0073    C
0074          ICODE=8
0075          INAME(1)=2HWR
0076          INAME(2)=2H17
0077          INAME(3)=2HC
0078          CALL EXEC (ICODE, INAME)
0079          END
0080    C
0081    C  Block data routine for AGS2C
0082    C
0083          BLOCK DATA AGS2C
0084          COMMON /AGS2C/ I(2330)
0085          END
0086          END$
```

```
&WR17C T=00004 IS ON CR32767 USING 00098 BLKS R=0545

0001  FTN4,L
0002  C      ****************************************************************
0003  C      *                                                              *
0004  C      *            SEGMENT:  WR17C                                   *
0005  C      *                                                              *
0006  C      *            ++++++++++++++++++++++++++++++++++++++            *
0007  C      *      FOR:  Walter Reed Army Institute of Research            *
0008  C      *            Department of Microwave Research                  *
0009  C      *            Walter Reed Army Medical Center                   *
0010  C      *            Washington, DC 20112                              *
0011  C      *                                                              *
0012  C      *            ++++++++++++++++++++++++++++++++++++++            *
0013  C      *                                                              *
0014  C      *       BY:  Technology USA, Inc.                              *
0015  C      *            P.O. Box 55333                                    *
0016  C      *            Fort Washington, Maryland 20744                   *
0017  C      *            Phone: (301) 292-2592                             *
0018  C      *                                                              *
0019  C      *  ------------------------------------------------------------*
0020  C      *     Segment WR17C is the control segment of WR17.  It puts   *
0021  C      *  out a menu with the options:                                *
0022  C      *    1 - Enter the number of azimuth steps and step size.      *
0023  C      *    2 - Enter the number of elevation steps and step size.    *
0024  C      *    3 - Enter subtraction file name.                          *
0025  C      *    4 - Set antennae to a new azimuth position.               *
0026  C      *    5 - Set antennae to a new elevation position.             *
0027  C      *    6 - Enter number of readings to average for each point.   *
0028  C      *    7 - Request graphs on the CRT.                            *
0029  C      *   10 - List on the printer.                                  *
0030  C      *    8 - Scan from the present position                        *
0031  C      *    9 - Terminate the program.                                *
0032  C      *  After 8 is chosen, the antennae are positioned at the       *
0033  C      *  present position-(number of data points-1)*step size/2.     *
0034  C      *  The amplitude and phase are converted to complex            *
0035  C      *  components, the corresponding components from the           *
0036  C      *  subtraction file deducted, and the results are saved in     *
0037  C      *  the array DAT along with the position.  Then the antennae   *
0038  C      *  are advanced by step size and the amplitude and phase are   *
0039  C      *  read again.  This is repeated for the specified number of   *
0040  C      *  steps per scan.                                             *
0041  C      *  After each scan, the data accumulated in array DAT is       *
0042  C      *  read out to a disc file, SCS11A.  If there is a file        *
0043  C      *  with that name already, the last letter is incremented.     *
0044  C      *  After the data is read out, elevation is incremented by     *
0045  C      *  elevation step size and the whole process repeated for      *
0046  C      *  the number of elevation steps.                              *
0047  C      *                                                              *
0048  C      ****************************************************************
0049        PROGRAM WR17C,5
0050        DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0051       *          ISIZE(2),ITITL(40),IREG(2),IFAT(3120),PRNTL(2),
0052       *          PLUNIT(2),FAT(1560),INA15(3),SAT(2,15),INSUB(3)
0053        INTEGER CRT,PRNT
0054        COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0055       *       IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESEL,IDCB,NAMEF,
0056       *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0057       *       PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0058        EQUIVALENCE (REG,IREG),(DAT,IFAT),(DAT,FAT)
```

```
0059  C
0060        COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,NONLY,
0061       *CM(4,112),IHEAD(40),IDATE(15)
0062        DATA LUAZ/31/,LUEL/35/,I1/15446B/,INA15/2HWR,2H15,2HT /,
0063       *INSUB/2H0 ,2H  ,2H  /
0064  C-----------------------------------------------------------------------
0065  C  Set number of scans if plots requested.
0066  C-----------------------------------------------------------------------
0067  C  If start of program, go to menu.
0068        IF (PRESAZ .EQ. 999.9) GO TO 525
0069  C  If graphing on screen, do not list data there.
0070        IF (IGRLOC .EQ. 1) ILFLAG = 0
0071  C  If finished with run, go reset position.
0072        IF (IDONE .GE. IEEND) GO TO 515
0073  C  If plotting every scan, go do next scan.
0074        IF (IPEND .EQ. 1) GO TO 8701
0075        IF (IDONE .NE. 1) GO TO 511
0076        IF (IPEND .GT. IEEND) GO TO 513
0077  C  Plotted first scan so now get back on schedule.
0078          ISEND = IPEND - 1
0079          GO TO 8701
0080    511 IF (IDONE+IPEND .GT. IEEND) GO TO 513
0081  C  Plot every specified scan.
0082          ISEND = IPEND
0083          GO TO 8701
0084  C  Scan to end of run without plotting.
0085    513   ISEND = IEEND - IDONE
0086          IPFLAG = -1
0087          GO TO 8701
0088  C-----------------------------------------------------------------------
0089  C  Reset original position.
0090  C-----------------------------------------------------------------------
0091    515 WRITE (CRT, 519)
0092   519  FORMAT (/,1X,"SCAN IS FINISHED",/,1X,
0093       *        "ANTENNAE ARE BEING RESET TO THEIR ORIGINAL POSITION",
0094       *        /,1X,"PLEASE EXCUSE THE DELAY")
0095        CALL SETPO (CRT, LUAZ, PRESAZ, 2, IERR)
0096        IF (IERR .EQ. 0) GO TO 522
0097          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0098          GO TO 9090
0099   522  PRESEL = PRESEL - ESTEPS*(IEEND-1)
0100        CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0101        IF (IERR .EQ. 0) GO TO 523
0102          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0103          GO TO 9090
0104  C  Reset parameters to original values.
0105    523 IF (IPFLAG .EQ. 0) GO TO 525
0106        ISEND = 1
0107        IPFLAG = 1
0108        ILFLAG = 1
0109   525  IDONE = 0
0110  C-----------------------------------------------------------------------
0111  C  Clear screen and print heading and menu.
0112  C-----------------------------------------------------------------------
0113        WRITE(CRT,529)
0114  0529  FORMAT(""
0115       *       10X,55'*',/,
0116       *10X,"*",20X,"PROGRAM  WR17",20X,"*",/,
0117       *10X,"*",15X,"S11 RASTER SCAN PROGRAM",15X,"*",/,
0118       *10X,55'*',/)
```

```
0119   530  CALL WR1 (CRT, LUAZ, PRESAZ, IERR, 0)
0120        IF (IERR .EQ. 0) GO TO 540
0121          CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0122          GO TO 9090
0123   540  CALL WR1 (CRT,LUEL,PRESEL,IERR,0)
0124        IF (IERR .EQ. 0) GO TO 550
0125          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0126          GO TO 9090
0127    550 IF (PRNT .EQ. 0) GO TO 555
0128          PRNTL(1) = 4H PRI
0129          PRNTL(2) = 4HNT
0130          GO TO 560
0131    555   PRNTL(1) = 4HNO P
0132          PRNTL(2) = 4HRINT
0133    560 WRITE(CRT,600) IAEND, ASTEPS, IEEND, ESTEPS, INSUB, PRESAZ,
0134       *                  PRESEL, IRNUM, IPEND, PLUNIT, PRNTL
0135   0600 FORMAT(" PROGRAM PARAMETER ENTRY",30X,"PRESENT VALUES",/,
0136       *"   1 - Number of azimuth steps and step size.....",
0137       *I3," x",F6.2," mm",/,
0138       *"   2 - Number of elevation steps and step size.....",
0139       *I3," x",F6.2," mm",/,
0140       *"   3 - Subtraction file name.....",2X,3A2,/,
0141       *"   4 - Azimuth position.....",
0142       *F8.3," mm",/,
0143       *"   5 - Elevation position.....",
0144       *F8.3," mm",/,
0145       *"   6 - Number of readings to average per point.....",I5,/,
0146       *"   7 - Number of scans per graphs.....",I5,1X,2A4,/,
0147       *"  10 - Toggle switch for listing on printer.....",2X,2A4,/,
0148       *" EXECUTION OPTIONS",/,
0149       *"   8 - Scan from the present position.",/,
0150       *"   9 - Terminate the program.",/"")
0151    610 WRITE (CRT,619)
0152   C  Clear old prompt with Esc h Esc J.
0153    619 FORMAT ("")
0154    620 WRITE (CRT,629)
0155    629 FORMAT (1X,"SELECT OPTION NUMBER _")
0156        READ(CRT,*) IANS
0157        IF (IANS .EQ. 9999) GO TO 9090
0158        IF (IANS .EQ. 10) GO TO 700
0159        IF (IANS .EQ. 9) GO TO 9090
0160        IF (IANS .EQ. 8) GO TO 8000
0161        IF (IANS .EQ. 7) GO TO 7000
0162        IF (IANS .EQ. 6) GO TO 6000
0163        IF (IANS .EQ. 5) GO TO 5000
0164        IF (IANS .EQ. 4) GO TO 4000
0165        IF (IANS .EQ. 3) GO TO 3000
0166        IF (IANS .EQ. 2) GO TO 2000
0167        IF (IANS .EQ. 1) GO TO 1000
0168        WRITE (CRT,659)
0169    659 FORMAT (/,1X,"ERROR # WR17 - 21001 .....(WR17)",/,1X,
0170       *"INCORRECT RESPONSE.  ENTER ANY NUMBER FROM 1 TO 10.")
0171        GO TO 620
0172   C-------------------------------------------------------------------
0173   C  Set to print on printer.
0174   C-------------------------------------------------------------------
0175    700 IF (PRNT .EQ. 6) GO TO 750
0176          PRNT = 6
0177          PRNTL(1) = 4H PRI
0178          PRNTL(2) = 4HNT
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0179          GO TO 760
0180    750   PRNT = 0
0181          PRNTL(1) = 4HNO P
0182          PRNTL(2) = 4HRINT
0183    760 WRITE (CRT,769) I1,(PRNTL(I),I=1,2)
0184    769 FORMAT (1A2, "a 54c 13Y",2A4)
0185        GO TO 610
0186  C-----------------------------------------------------------------
0187  C  Inquire from user:  frequency step size and number of steps.
0188  C-----------------------------------------------------------------
0189  C 800 WRITE (CRT,809)
0190  C 809 FORMAT (/,1X,"Enter the number of frequency steps.  _")
0191  C     READ (CRT,*) IFEND
0192  C     IF (IFEND .EQ. 9999) GO TO 9090
0193  C     IF ((IFEND*(IAEND+1) .LE. 520) .AND. (IFEND .GT. 0)) GO TO 825
0194  C       WRITE (CRT,819)
0195  C 819 FORMAT (/,1X,"ERROR # WR17 - 21002 ......(WR17)",/,
0196  C    *" THE NUMBER OF STEPS MUST BE FROM 1 TO 520/(AZIMUTH STEPS + 1).",
0197  C    *        /,1X,"REENTER THE NUMBER OF FREQUENCY STEPS.")
0198  C       GO TO 800
0199  C 825 WRITE (CRT,829)
0200  C 829 FORMAT (/,1X,"Enter the frequency step size (MHz). _")
0201  C     READ (CRT,*) FSTEPS
0202  C     IF (FSTEPS .EQ. 9999) GO TO 9090
0203  C     IF ((RFREQ+(IFEND-1)*FSTEPS) .LE. TEMP2) GO TO 850
0204  C       WRITE (CRT,3509) TEMP1, TEMP2
0205  C     READ (CRT, 839) IANS
0206  C 839 FORMAT (A2)
0207  C     IF (IANS .EQ. 2HYE) GO TO 9000
0208  C       GO TO 800
0209  C 850 WRITE (CRT,859) I1, IFEND, FSTEPS
0210  C 859 FORMAT (1A2,"a 52c 14Y",I3," x",F5.0)
0211  C     GO TO 610
0212  C-----------------------------------------------------------------
0213  C  Inquire from the user:  azimuth step size and number of steps.
0214  C-----------------------------------------------------------------
0215  1000  WRITE(CRT,1100)
0216  1100  FORMAT(/," Enter the number of azimuth steps per scan.  _")
0217        READ(CRT,*) IAEND
0218        IF (IAEND .EQ. 9999) GO TO 9090
0219        IF ((IFEND*(IAEND+1) .LE. 520) .AND. (IAEND .GT. 0)) GO TO 1190
0220          WRITE (CRT,1109)
0221   1109   FORMAT (/," ERROR # WR17 - 21203 ......(WR17)",/,
0222       *" NUMBER OF STEPS MUST BE FROM 1 TO 520/(FREQUENCY STEPS)-1.",
0223       *        /," REENTER THE NUMBER OF AZIMUTH STEPS.")
0224          GO TO 1000
0225  1190  WRITE(CRT,1200)
0226  1200  FORMAT(/," Enter the step size (mm).......  _")
0227        READ(CRT,*) ASTEPS
0228        IF (ASTEPS .EQ. 9999) GO TO 9090
0229        WRITE (CRT,1209) I1,IAEND,ASTEPS
0230   1209 FORMAT (1A2,"a 52c 6Y",I3," x",F6.2)
0231        GO TO 610
0232  C-----------------------------------------------------------------
0233  C  Inquire from user: elevation step size and number of steps.
0234  C-----------------------------------------------------------------
0235  2000  WRITE (CRT,2009)
0236  2009  FORMAT (/,1X,"Enter the number of elevation steps. _")
0237        READ (CRT,*) IEEND
0238        IF (IEEND .EQ. 9999) GO TO 9090
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0239         IF (IEEND .GT. 0) GO TO 2028
0240           WRITE (CRT,2019)
0241    2019   FORMAT (/,1X,"ERROR # WR17 - 21404 ......(WR17)",/,
0242        *            1X,"THE NUMBER OF STEPS MUST BE GREATER THAN 0.",/,
0243        *            1X,"REENTER THE NUMBER OF ELEVATION STEPS.")
0244           GO TO 2000
0245    2028 WRITE (CRT,2029)
0246    2029  FORMAT (/,1X,"Enter the elevation step size (mm). _")
0247         READ (CRT,*) ESTEPS
0248         IF (ESTEPS .EQ.9999) GO TO 9090
0249         WRITE (CRT,2039) I1, IEEND, ESTEPS
0250    2039 FORMAT (1A2,"a 52c 7Y",I3," x",F6.2)
0251         GO TO 610
0252    C-------------------------------------------------------------------
0253    C  Inquire from the user:  microwave frequency.
0254    C-------------------------------------------------------------------
0255    C3000 WRITE(CRT,3500)
0256    C3500 FORMAT(/," Enter the RF frequency (MHz)...  _")
0257    C     READ(CRT,*)  RFREQ
0258    C     IF (RFREQ .EQ. 9999) GO TO 9090
0259    C     IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 3600
0260    C       WRITE (CRT,3509) TEMP1, TEMP2
0261    C3509   FORMAT (/,1X,"ERROR # WR17 - 21204 ......(WR17)",/,1X,
0262    C    *           "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0263    C    *           /,1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0264    C    *           /,1X,"Do you wish to recalibrate?  (YES/NO) _")
0265    C       READ (CRT,3599) IANS
0266    C3599   FORMAT (A2)
0267    C       IF (IANS .EQ. 2HYE) GO TO 9000
0268    C       GO TO 3000
0269    C3600 WRITE (CRT, 3609) I1, RFREQ
0270    C3609 FORMAT (1A2,"a 54c 8Y",F5.0)
0271    C     GO TO 610
0272    C-------------------------------------------------------------------
0273    C  Inquire from user subtraction file name.
0274    C-------------------------------------------------------------------
0275     3000 WRITE (CRT, 3009)
0276     3009 FORMAT (/,1X,"Enter subtraction file name... _")
0277         READ (CRT, 3019) INSUB
0278     3019 FORMAT (3A2)
0279         IF ((INSUB(1) .EQ. 2H99) .AND. (INSUB(2) .EQ. 2H99)) GO TO 9090
0280         IF (INSUB(1) .EQ. 1H0) GO TO 610
0281           CALL OPEN (IDCB, IERR, INSUB)
0282           IF (IERR .NE. -6) GO TO 3300
0283             WRITE (CRT, 3029)
0284     3029    FORMAT (/,1X,"ERROR # WR17 - 21005 ......(WR17)",/,1X,
0285        *                 "UNABLE TO FIND THIS FILE, TRY AGAIN")
0286             GO TO 3000
0287     3300    IF (IERR .GE. 0) GO TO 3400
0288             WRITE (CRT, 3309) IERR
0289     3309    FORMAT (/,1X,"ERROR #",I3," OCCURRED IN SUBROUTINE OPEN")
0290             GO TO 620
0291     3400 CALL READF(IDCB, IERR, IFAT, 6)
0292         IF (IERR .EQ. 0) GO TO 3500
0293           WRITE (CRT, 3409) IERR
0294     3409   FORMAT (/," ERROR #",I3," OCCURRED IN SUBROUTINE OPEN")
0295           GO TO 620
0296     3500 DO 3800 I = 1, 15
0297         CALL READF(IDCB, IERR, IFAT, 6, LEN)
0298         IF (IERR .EQ. 0) GO TO 3600
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0299         IF (IERR .EQ. -12) GO TO 3550
0300           WRITE (CRT,3509) IERR
0301    3509   FORMAT (/,1X,"ERROR #",I3," OCCURRED IN SUBROUTINE READF")
0302           GO TO 620
0303    3550 SAT(1,I) = 0.
0304         SAT(2,I) = 0.
0305         GO TO 3850
0306    3600 RADIAN = 3.141593 * DAT(3,1) / 180.
0307         AMPLIT = 10.**(-DAT(2,1) / 20.)
0308         SAT(1,I) = AMPLIT * COS (RADIAN)
0309         SAT(2,I) = AMPLIT * SIN (RADIAN)
0310    3800 CONTINUE
0311    3850 WRITE (CRT, 3859) I1, INSUB
0312    3859 FORMAT (1A2,"a 54c 8Y",3A2)
0313         GO TO 610
0314    C-------------------------------------------------------------------------
0315    C  Inquire new azimuth position and call WR6 to set it.
0316    C-------------------------------------------------------------------------
0317    4000  WRITE (CRT,4090)
0318     4090 FORMAT (/,1X,"Enter new azimuth (mm).  _")
0319         READ (CRT,*) PRESAZ
0320         IF (PRESAZ .EQ. 9999) GO TO 9090
0321         CALL SETPO (CRT,LUAZ,PRESAZ,2,IERR)
0322         IF (IERR .EQ. 0) GO TO 4400
0323           CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0324           GO TO 620
0325    4400 WRITE (CRT,4409) I1,PRESAZ
0326    4409 FORMAT (1A2,"a 52c 9Y",F8.3)
0327         GO TO 610
0328    C-------------------------------------------------------------------------
0329    C  Inquire new elevation and call WR6 to set it.
0330    C-------------------------------------------------------------------------
0331    5000  WRITE (CRT,5090)
0332    5090  FORMAT (/,1X,"Enter new elevation _")
0333          READ (CRT,*) PRESEL
0334          IF (PRESEL .EQ. 9999) GO TO 9090
0335          CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0336          IF (IERR .EQ. 0) GO TO 5500
0337            CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0338            GO TO 620
0339     5500 WRITE (CRT,5509) I1, PRESEL
0340     5509 FORMAT (1A2,"a 52c 10Y",F8.3)
0341          GO TO 610
0342    C-------------------------------------------------------------------------
0343    C  Inquire from the user: number of readings per data point.
0344    C-------------------------------------------------------------------------
0345    6000  WRITE (CRT,6009)
0346    6009  FORMAT (/,1X,
0347         *       "Enter number of readings to average per data point. _")
0348          READ (CRT,*) IRNUM
0349          IF (IRNUM .EQ. 9999) GO TO 9090
0350          IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0))  GO TO 6600
0351          WRITE (CRT,6509)
0352    6509  FORMAT (/,1X,"ERROR # WR17 - 21006 ......(WR17)",/,
0353         *         1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0354         *         1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0355          GO TO 6000
0356     6600 WRITE (CRT, 6609) I1, IRNUM
0357     6609 FORMAT (1A2,"a 52c 11Y",I5)
0358          GO TO 610
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0359  C-----------------------------------------------------------------------
0360  C  Inquire from user:  number of scans per graph.
0361  C-----------------------------------------------------------------------
0362   7000 WRITE (CRT,7009)
0363   7009 FORMAT (/,1X,"Enter number of scans between graphs on screen. _")
0364        READ (CRT,*) IPEND
0365        IF (IPEND .EQ. 9999) GO TO 9090
0366        IF (IPEND .GE. 0) GO TO 7500
0367          WRITE (CRT,7209)
0368   7209   FORMAT (/,1X,"ERROR # WR17 - 21007 ......(WR17)",/,
0369       *       1X,"NUMBER OF SCANS CAN NOT BE LESS THAN 0",/,
0370       *       1X,"REENTER NUMBER OF SCANS BETWEEN GRAPHS ON CRT.")
0371          GO TO 7000
0372   7500 WRITE (CRT,7509)
0373   7509 FORMAT (/,1X,"Enter '1' to plot on CRT or '0' to plot on ",
0374       *             "plotter. _")
0375        READ (CRT,*) IGRLOC
0376        IPFLAG = 1
0377        PLUNIT(1) = 4H-PLO
0378        PLUNIT(2) = 4HTTER
0379        IF (IGRLOC .NE. 1) GO TO 7550
0380          PLUNIT(1) = 4H - C
0381          PLUNIT(2) = 4HRT
0382   7550 IF (IPEND .NE. 0) GO TO 7600
0383          IPFLAG = 0
0384          PLUNIT(1) = 4HGRAP
0385          PLUNIT(2) = 4HHS
0386   7600 ISEND = 1
0387        WRITE (CRT, 7609) I1, IPEND, (PLUNIT(I),I=1,2)
0388   7609 FORMAT (1A2,"a 52c 12Y",I5,1X,2A4)
0389        GO TO 610
0390  C-----------------------------------------------------------------------
0391  C  Set antennae to first position and create disc data file.
0392  C-----------------------------------------------------------------------
0393  C  Find title for file.
0394   8000 WRITE (CRT,8009) (ITITL(I),I=1,40)
0395   8009 FORMAT (/,1X,
0396       *"Enter title of file or press 'RETURN' key for following title.",
0397       */,40A2,/)
0398  C  Blank out rest of 80 bytes of title.
0399        REG = EXEC (1,401B,ITITL,-80)
0400        IF (IREG(2) .EQ. 0) GO TO 8100
0401        IF (IREG(2) .GT. 78) GO TO 8060
0402        DO 8050 I = (IREG(2)+3)/2,40
0403   8050 ITITL(I) = 2H
0404   8060 IF ((IREG(2)/2)*2 .EQ. IREG(2)) GO TO 8100
0405        ITITL(IREG(2)/2+1) = (ITITL(IREG(2)/2+1)/256)*256 + 32
0406  C  Set azimuth to -(1/2 of scan).
0407   8100 POSITN = PRESAZ-ASTEPS*(IAEND-1)/2
0408        PARAM = POSITN
0409        CALL WR6(PARAM,IERR,2,0)
0410        IF (IERR .EQ.0) GO TO 8200
0411          CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0412          GO TO 620
0413  C  Record size = 3 double words * (steps in scan + 1).
0414   8200 ISIZE(2) = 6 * (IAEND + 1)
0415  C  Minimum record size = 128.
0416        IF (ISIZE(2) .LT. 128) ISIZE(2) = 128
0417  C  File size = record size * (elevation steps * frequency steps + 1).
0418        ISIZE(1) = (ISIZE(2) * (IEEND * IFEND + 1) + 127)/128
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```
0419    8300 NAMEF(3) = NAMEF(3) + 1
0420         CALL CREAT (IDCB,IERR,NAMEF,ISIZE,2)
0421         IF (IERR .GE. 0) GO TO 8450
0422         IF (IERR .EQ. -2) GO TO 8300
0423         WRITE (CRT,8409) IERR
0424    8409 FORMAT (/,1X,"ERROR #",I3," OCCURED IN SUBROUTINE CREAT")
0425         GO TO 9090
0426    8450 IF (PRNT .EQ. 0) GO TO 8500
0427    C  Print title and menu on line printer.
0428         WRITE (PRNT,8459) (ITITL(I),I=1,40),(NAMEF(I),I=1,3)
0429    8459 FORMAT ("1",40A2,/,1X,"FILE = ",3A2)
0430         WRITE (PRNT,600) IAEND,ASTEPS,IEEND,ESTEPS,INSUB,PRESAZ,
0431        *                 PRESEL,IRNUM,IPEND,PLUNIT,PRNTL
0432    8500 WRITE (CRT,8509) NAMEF
0433    8509 FORMAT (/,1X,"NAME OF DATA FILE IS ",3A2)
0434    C  Put specifications in first record.
0435         CALL FTIME(IFAT)
0436         DO 8550 I=1,40
0437    8550 IFAT(15+I) = ITITL(I)
0438         IFAT(56) = 2HEL
0439         IFAT(57) = 0
0440         IFAT(58) = IAEND
0441         FAT(30) = ASTEPS
0442         IFAT(61) = 0
0443         IFAT(62) = IEEND
0444         FAT(32) = ESTEPS
0445         FAT(33) = RFREQ
0446         IFAT(67) = ISIZE(1)
0447         IFAT(68) = ISIZE(2)
0448         IFAT(69) = 0
0449         IFAT(70) = IFEND
0450         FAT(36) = FSTEPS
0451         ILFLAG = 1
0452         CALL WRITF (IDCB, IERR, FAT)
0453         IF (IERR .EQ. 0) GO TO 8700
0454           WRITE (CRT,8609) IERR
0455    8609   FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0456           GO TO 9090
0457    C-----------------------------------------------------------------------
0458    C Elevation scan from PRESEL to PRESEL+ESTEPS*(IEEND-1) or until graph needed.
0459    C-----------------------------------------------------------------------
0460    8700 IF (IPEND .EQ. 0) ISEND = IEEND
0461         ID = 1
0462         IDRCT = 1
0463    8701 DO 8900 J=1,ISEND
0464         IF (J + IDONE .EQ. 1) GO TO 8720
0465    C  If not first scan, switch direction and increment elevation.
0466           IDRCT = -IDRCT
0467           PRESEL = PRESEL + ESTEPS
0468           PARAM = PRESEL
0469           CALL WR6 (PARAM, IERR, 4, 1)
0470           IF (IERR .EQ. 0) GO TO 8720
0471             CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0472             GO TO 620
0473    8720 CALL WR1 (CRT, LUEL, TRUEL, IERR, 0)
0474         IF (IERR .EQ. 0) GO TO 8725
0475           CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0476           GO TO 9090
0477    C-----------------------------------------------------------------------
0478    C  Azimuth scan from PRESAZ-ASTEPS*(IAEND-1)/2 to PRESAZ+ASTEPS*(IAEND-1)/2
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0479  C-----------------------------------------------------------------
0480   8725 DO 8800 I=1,IAEND
0481  C  If break flag set, go back to menu.
0482        IF (IFBRK(IERR)) 523,8730
0483   8730 CALL WR1 (CRT, LUAZ, TRUAZ, IERR, 0)
0484        IF (IERR .EQ. 0) GO TO 8735
0485          CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0486          GO TO 9090
0487  C  Do frequency scan at each position.
0488   8735   CALL CORS5(1, 4, IRNUM)
0489        DO 8790 L = 1, IFEND
0490          CALL CALF2(2, L, F)
0491          CALL CPOL2(CM(1,L),X,Y)
0492          IF (INSUB(1) .EQ. 1H0) GO TO 8750
0493            RADIAN = 3.141593 * Y / 180.
0494            Y = X * SIN (RADIAN) - SAT (2,L)
0495            X = X * COS (RADIAN) - SAT (1,L)
0496            XX = X*X + Y*Y
0497            Y = 180. * ATAN2(Y, X) / 3.141593
0498            GO TO 8755
0499   8750 XX = X * X
0500   8755 RLOSS = -10 * ALOGT (XX)
0501        IF (ILFLAG .EQ.0) GO TO 8780
0502        WRITE (CRT,8779) F,TRUAZ,RLOSS,Y
0503   8779 FORMAT (1X,"FREQ =",F6.0,5X,"AZIMUTH =",F8.3,5X,
0504       *         "RLOSS =",F9.4,5X,"PHASE =",F8.3)
0505   8780 IL = ID + (L - 1) * (IAEND + 1)
0506        DAT(1,IL) = TRUAZ
0507        DAT(2,IL) = RLOSS
0508        DAT(3,IL) = Y
0509   8790 CONTINUE
0510        IF (I .GE. IAEND) GO TO 8800
0511        ID = ID + IDRCT
0512        POSITN = POSITN + IDRCT * ASTEPS
0513        PARAM = POSITN
0514        CALL WR6(PARAM,IERR,2,0)
0515        IF (IERR .EQ.0) GO TO 8800
0516          CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0517          GO TO 9090
0518   8800 CONTINUE
0519  C-----------------------------------------------------------------
0520  C  End of azimiuth scan loop.
0521  C-----------------------------------------------------------------
0522        IF (PRNT .EQ. 0) GO TO 8830
0523          WRITE (PRNT,8829) TRUEL
0524   8829 FORMAT (//,5X,"ELEVATION =",F8.3)
0525   8830   DO 8890 L = 1, IFEND
0526          ILB = 1 + (L -1) * (IAEND + 1)
0527          ILE = L * (IAEND + 1)
0528          DAT(1,ILE) = TRUEL
0529          DAT(2,ILE) = RFREQ + (L - 1) * FSTEPS
0530        IF (PRNT .EQ. 0) GO TO 8850
0531          DO 8840 IE = ILB,ILE - 1
0532   8840     WRITE (PRNT, 8849) DAT(2,ILE), (DAT(I,IE),I=1,3)
0533   8849 FORMAT (1X,"FREQ =",F6.0,5X,"AZIM =",F8.3,
0534       *         5X,"RLOSS =",F8.3,5X,"PHASE =",F8.3)
0535   8850 CALL WRITF (IDCB,IERR,DAT(1,ILB))
0536        IF (IERR .EQ. 0) GO TO 8890
0537          WRITE (CRT,8859) IERR
0538   8859   FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
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0539           GO TO 9090
0540    8890 CONTINUE
0541    8900 CONTINUE
0542  C-------------------------------------------------------------------
0543  C  End of elevation scan loop
0544  C-------------------------------------------------------------------
0545         IDONE = IDONE + ISEND
0546  C  If no scans, go to reset origianl position.
0547         IF (IPFLAG .LT. 1) GO TO 515
0548  C-------------------------------------------------------------------
0549  C  Call EXEC to overlay this segment with WR15G
0550  C-------------------------------------------------------------------
0551    8990 IF (IGRLOC .EQ. 1) GO TO 8995
0552         INA15(3) = 2HG
0553         GO TO 8998
0554    8995 INA15(3) = 2HT
0555    8998 CALL EXEC (ICODE,INA15)
0556  C9000 WRITE (CRT,9009)
0557  C9009 FORMAT (2/,1X,"Run program AGS02 for new calibration.")
0558    9090 WRITE (CRT,9099)
0559    9099 FORMAT (/,10X,
0560        *"**********  PROGRAM WR17 TERMINATED  **********")
0561         CALL CLOSE (IDCB)
0562         END
0563  C-------------------------------------------------------------------
0564  C  Subroutine SETPO calls WR6 to set an azimuth or elevation position
0565  C  and then calls WR1 to check the position.  If it is within .002 it
0566  C  returns, if not it calls WR6 once again.
0567  C-------------------------------------------------------------------
0568         SUBROUTINE SETPO(CRT,LU,PRES,UNIT,IERR)
0569         DO 100 I = 1,2
0570           PARAM = PRES
0571           CALL WR6 (PARAM,IERR,UNIT,0)
0572           IF (IERR .NE. 0) RETURN
0573           IF (I .GT. 1) RETURN
0574  C        IF (LU .EQ. 33) GO TO 90
0575           CALL WR1 (CRT,LU,NEW,IERR,0)
0576  C        GO TO 91
0577  C   90   CALL WR3 (CRT,LU,NEW,IERR,0)
0578       91   IF (IERR .NE. 0) RETURN
0579           IF (ABS(NEW-PRES) .LT. .002) RETURN
0580      100 CONTINUE
0581         RETURN
0582         END
0583         END$
```

END

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